datron
ELECTRONICS LIMITED

SERVICING MANUAL
for
DATRON MODEL 1041
DIGITAL VOLTMETER

HURRICANE WAY
NORWICH AIRPORT INDUSTRIAL ESTATE NORWICH NR6 6JB ENGLAND

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_11464

SERVICING MANUAL
for
DATRON MODEL 1041
DIGITAL VOLTMETER

(for general information and specification refer to the Operating Manual)

Instrument Designed and Manufactured by:–

DATRON ELECTRONICS LTD.
HURRICANE WAY,
NORWICH AIRPORT INDUSTRIAL ESTATE,
NORWICH, NR6 6JB.

Telephone: (0603) 404824

850015 Issue 2.

Due to our policy of continuously updating our products, this manual may contain minor differences in specification, components and circuit design to the instrument actually supplied. Amendment sheets precisely matched to your instrument serial number are available on request.

CONTENTS

GENERAL DESCRIPTION . . . . . .
INSTALLATION . . . . . .
CONTROLS AND CONNECTIONS . . . . . Refer to Operating Manual
SPECIFICATION AND SPECIFICATION VERIFICATION . . . . . .
OPERATION AND APPLICATIONS . . . . . .

Section	Title	Page
1	TECHNICAL DESCRIPTION	1
1.1	GENERAL	1
1.2	DC ISOLATOR	1
1.2.1	Preamplifier Scaling	1
1.2.2	Preamplifier	4
1.2.3	Drift Compensation	4
1.2.4	Filtering	4
1.2.5	Isolator Range Coding/Decoding	5
1.2.5.1	DC Coding	5
1.2.5.2	AC Coding	6
1.2.5.3	Resistance Converter Coding	6
1.2.5.4	Filter	6
1.2.6	Auto Range and Range Selection	7
1.2.7	Models 01 and 11 AC Converter	7
1.2.7.1	Preamplifier	7
1.2.7.2	RMS Converter	9
1.2.8	Resistance Converter	10
1.3	ANALOGUE TO DIGITAL CONVERTER	13
1.3.1	Analog Section	13
1.3.1.1	General	13
1.3.1.2	Signal Integrate Period	16
1.3.1.3	Reference Integrate Period	16
1.3.1.4	Reset Period	16
1.3.1.5	References	17
1.3.2	Digital Section	18
1.3.2.1	Command	20
1.3.2.2	Signal Integrate Period	20
1.3.2.3	Reference Integrate Period	20
1.3.2.4	Display and Reset	20
1.3.2.5	External Control	22
1.4	DISPLAY	22
1.5	POWER SUPPLIES	22
1.5.1	General	22
1.5.2	± 15V, + 5V Supplies	22
1.5.3	180V Supply	22
1.6	OPTIONS	23
1.6.1	B01 and B01a BCD Outputs	23
1.6.2	B02 and B02a BCD Outputs	23
1.6.3	A01 Analog Output	23
1.6.4	R01 Parallel Rear Input	23
1.6.5	F01 Fast Read Rate	23
1.6.6	SF1 Superfast Read Rate	23

Section		Title	Page
1	1.6.7	P01 Remote Programming	23
	1.6.8	R02 and R05 External Reference (Ratio)	24
2	MAINTENANCE		27
	2.1	INTRODUCTION	27
	2.1.1	General	27
	2.1.2	Removal of Covers – Access for Calibration or Repair	27
	2.2	ROUTINE CALIBRATION	28
	2.2.1	General	28
	2.2.2	Test Equipment Required	28
	2.2.2.1	DC Calibrator	28
	2.2.2.2	DC Voltmeter	28
	2.2.2.3	AC Calibrator	28
	2.2.2.4	Crest Factor Signal	28
	2.2.2.5	Precision Resistors	29
	2.2.3	Procedures	29
	2.2.3.1	General	29
	2.2.3.2	DC Voltage Calibration	29
	2.2.3.3	AC Voltage Calibration Option 01 and 11)	30
	2.2.3.4	Ohms Converter Calibration (Option 02)	31
	2.2.3.5	External Reference (Ratio) Calibration (Option R02)	32
	2.2.3.6	External Reference (Ratio) Calibration (Option R05)	32
	2.3	REPAIR AND COMPONENT REPLACEMENT	
3	COMPONENTS LISTS		
	3.1	DC Isolator	400035
	3.2	AC Converter (Option 01/11)	400037
	3.3	Resistance Converter (Option 02)	400036
	3.4	A – D Converter	409120
	3.5	Sperry Display	400026
	3.6.1	B01 BCD Output Option	400348
	3.6.2	B01a BCD Output Option	400058
	3.7.1	B02 BCD Output Option	400349
	3.7.2	B02a BCD Output Option	400023
	3.8	F01 Fast Read Rate Option	440037
	3.9	SF1 Superfast Read Rate Option	400258
	3.10	R02 1V Ratio Option	400076
	3.11	R05 10V/100V Ratio Option	400179
4	BOARD LAYOUT AND CIRCUIT DIAGRAMS		
	4.1	DC Isolator	400035/430010
	4.2	AC Converter (Option 01/11)	400037/430016
	4.3	Resistance Converter (Option 02)	400036/430008
	4.4	A – D Converter	409120A/430004
	4.5	Sperry Display	400026/430007
	4.6.1	B01 BCD Output Option	400348/430348
	4.6.2	B01a BCD Output Option	400058/430042
	4.7.1	B02 BCD Output Option	400349/430349
	4.7.2	B02a BCD Output Option	400023/430002
	4.8	SF1 Superfast Read Rate Option	400258/430258
	4.9	R02 1V Ratio Option	400076/430017
	4.10	R05 10V/100V Ratio Option	400179/430179

ILLUSTRATIONS AND TABLES

Fig.	Title	Page
1.1	Simplified Diagram of DC Isolator	1
1.2	Simplified Diagram of Isolator Switching	2
1.3	Separate Range Switching	3
1.4	Filter Network	5
1.5	Simplified AC Converter Amplifier	8
1.6	AC Preamplifier Gain Configurations	8
1.7	True RMS Converter	9
1.8	Simplified Ω Schematic	11
1.9	Simplified Ω Current Switching	12
1.10	Ω Guard	13
1.11	Dual-slope integrator switching	14
1.12	Integrator Timing Diagram – Analog Section	15
1.13	Reference Circuit	17
1.14	Simplified diagram of digital circuit	18
1.15	Digital Section Timing Diagram	19
1.16	Counter Sequence Summary	21
1.17	External Reference Amplifier	25

SECTION 1

TECHNICAL DESCRIPTION

1.1 GENERAL

The internal circuits of the 1041 are divided between two printed circuit boards, in the basic machine. The first printed board (Schematic No. 430010) is the DC isolator mother board and includes the preamplifier, scaling circuits, bootstrapped supplies, and range logic. The second board (Schematic No. 430004) is concerned with Analogue to Digital conversion and produces the BCD output together with drive for the Sperry displays. The regulated power supply components are also mounted on this board. When AC and Ω are specified these are incorporated on two separate boards plugging into the main isolator mother board.

For the purpose of explanation boards will be described separately and each board further sub-divided according to the various functions involved.

1.2 DC ISOLATOR (Assembly Drawing No. 400035)

This is split in three distinct sections: isolator, range encoding/decoding, and range logic.

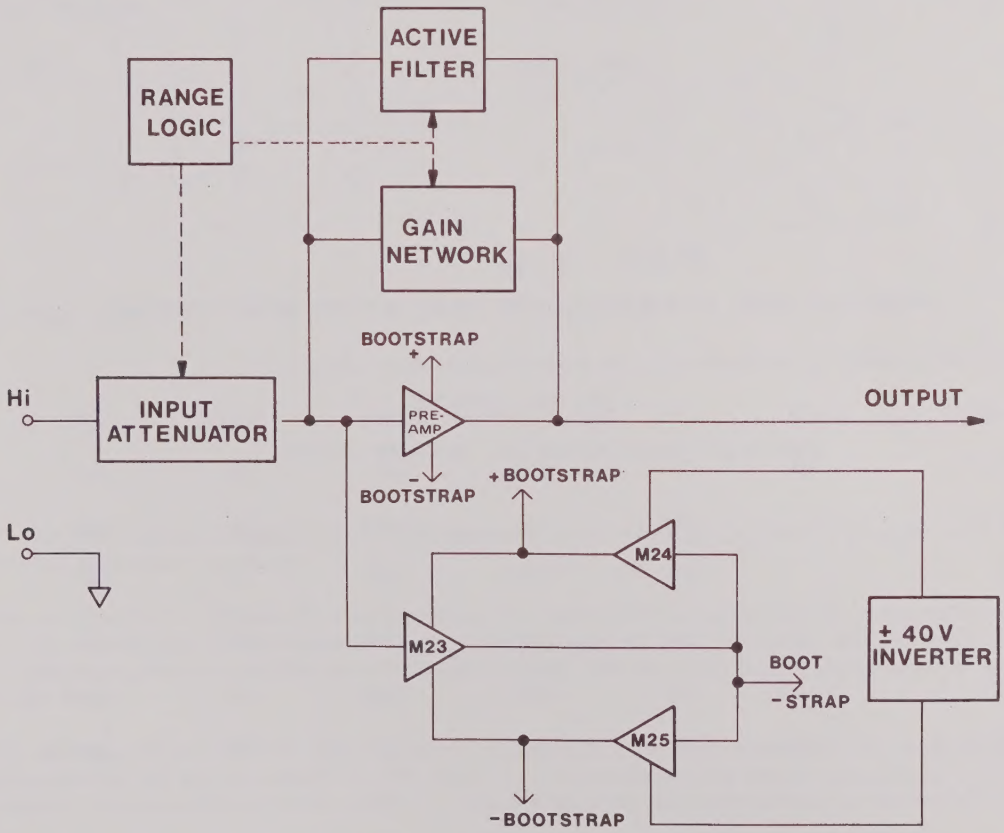


FIG. 1.1

SIMPLIFIED DIAGRAM OF DC ISOLATOR

1.2.1 Preamplifier Scaling

The simplified diagram, Fig. 1:2 shows the essential features of the isolator scaling circuit. For the purpose of explanation the same symbols are used (Black triangular contact normally 'made', white triangular contact normally 'open') regardless of whether the switching is accomplished electronically (F.E.T.) or by means of relay contacts. In Fig. 1:2 all switching is shown in the 1V RANGE position.

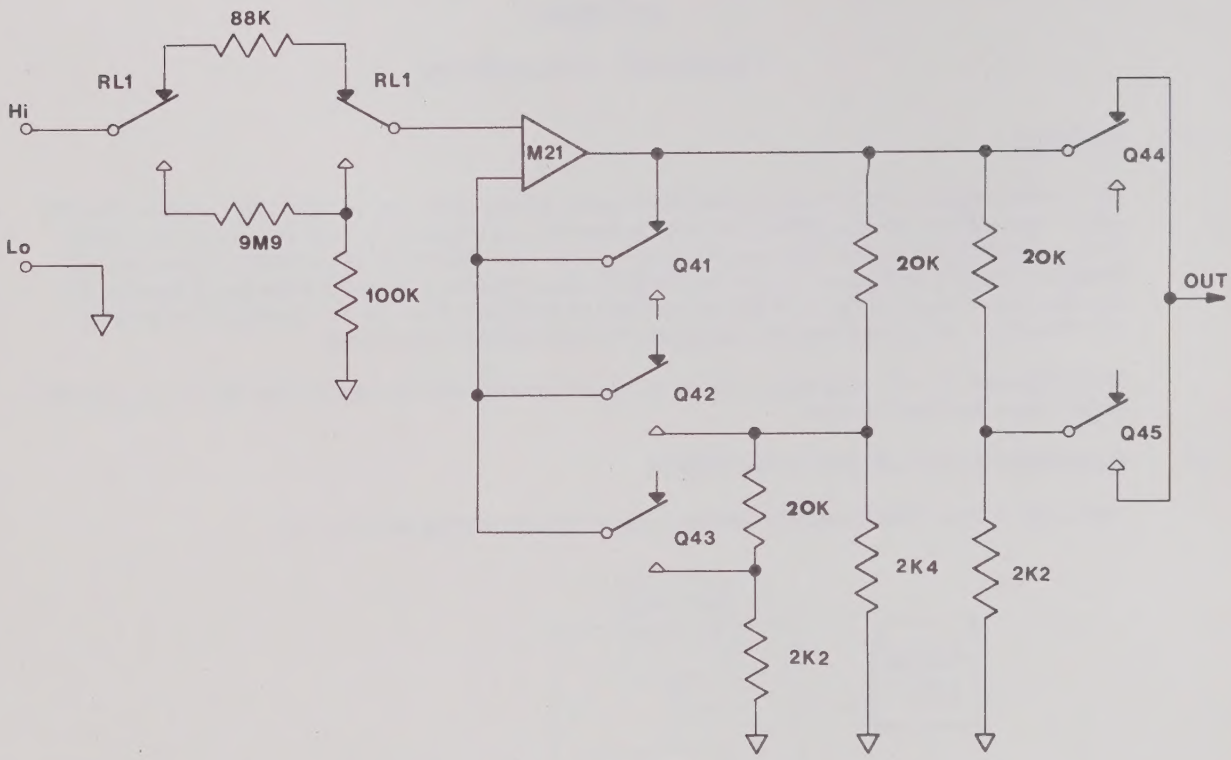


FIG. 1.2

SIMPLIFIED DIAGRAM OF ISOLATOR SWITCHING

The various switching combinations for the different ranges are as follows:–

RANGE	GAIN	Q41	Q42	Q43	Q44	Q45	RL1
10mV	X100	OFF	OFF	ON	ON	OFF	OFF
100mV	X10	OFF	ON	OFF	ON	OFF	OFF
1V	X1	ON	OFF	OFF	ON	OFF	OFF
10V	÷ 10	ON	OFF	OFF	OFF	ON	OFF
100V	÷ 100	ON	OFF	OFF	ON	OFF	ON
1000V	÷ 1000	ON	OFF	OFF	OFF	ON	ON

The different circuit configurations are shown in Fig. 1:3.

Having grasped the basic essentials, reference should be made to circuit diagram No. 430010, Sheets 2 and 3, for a more detailed explanation.

Resistor chain R1 – R4, 100kΩ total, is in series with the Hi input on all ranges from 10mV – 10V. The amplifier end of R4 is clamped by zener diodes Z5, Z6 and Q49, Q50 to the bootstrap rail which is in turn clamped to Lo (0.) by zener diodes Z7, Z8. This means that the amplifier input can never exceed approximately ± 35V: the sum of the zener diode voltage drops. The 100k chain limits the current in overload. The power dissipation of the chain is such that 1000V can be applied continuously.

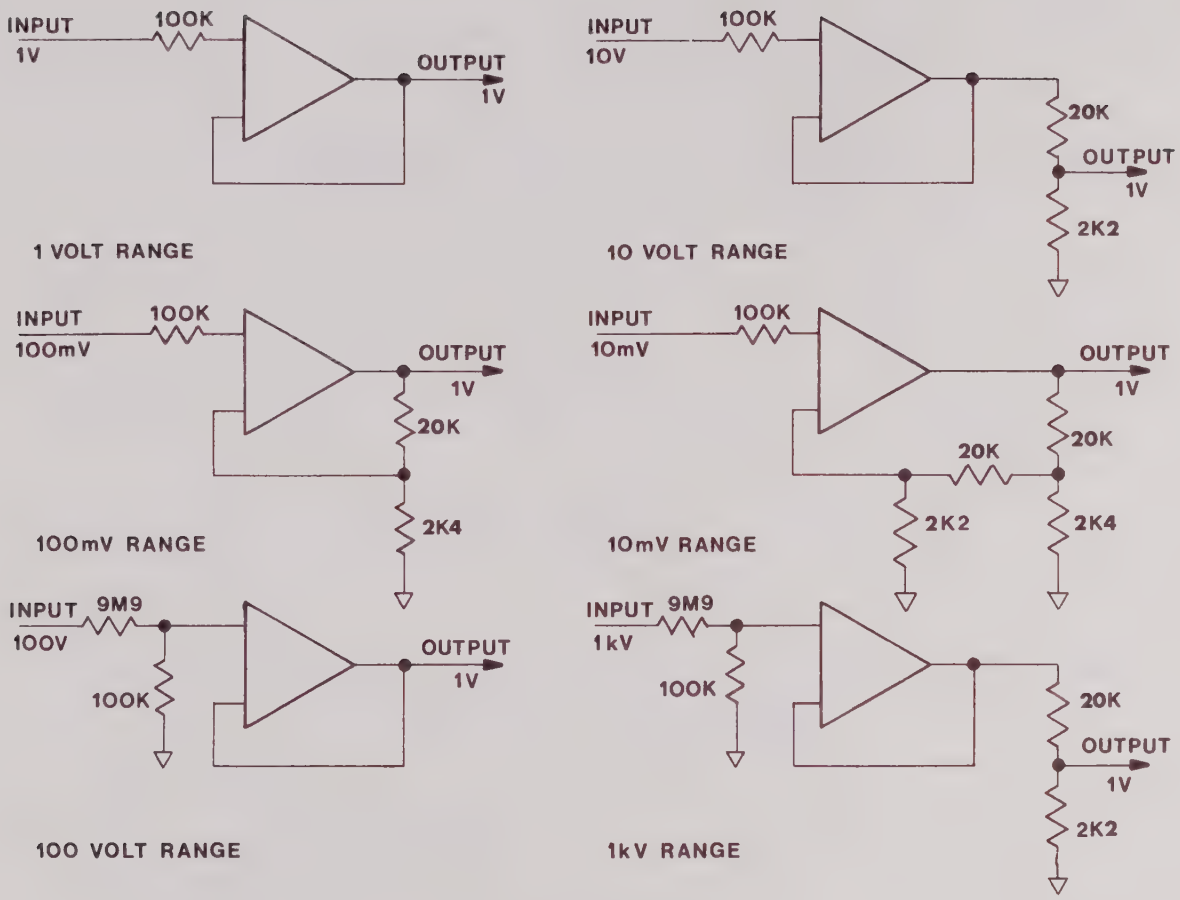


FIG. 1.3

SEPARATE RANGE SWITCHING

On the 100V and 1kV ranges a ÷ 100 10MΩ input attenuator is switched in. This is a matched set of resistors for low temperature coefficient.

On selecting 10mV, Q43 and Q44 are turned on, all other F.E.T's are turned off. The output of M27, the buffer of the preamplifier, is then connected to its inverting input via R21, R22, R24, R25, an attenuator chain of ÷ 100 which gives the amplifier an overall gain of X100. Q44 connects the preamplifier directly to the output buffer M22.

On selecting 100mV Q42 and Q44 are turned on: all other F.E.T's are turned off. The preamplifier output is connected to its inverting input via R21, R22, a ÷ 10 attenuator. The overall amp gain is X10. Q44 again connects the preamplifier directly to M22.

With 1V selected Q41 and Q44 are turned on. The preamplifier output is now connected directly to its inverting input giving a gain of unity.

For 10V range Q41 is kept on, retaining a gain of unity but the output of the preamplifier is attenuated by 10 (R33 – R34) before being passed to the output buffer via Q45 instead of Q44.

The 100V range selects the 1V range and inserts a ÷ 100 attenuator (R57, R60) between the Hi and the preamplifier input.

The 1kV range selects the 10V range and also inserts the same ÷ 100 attenuator at the front end.

1.2.2 Preamplifier

The preamplifier is designed to present an input impedance of greater than 10,000MΩ for signals up to ± 20V.

Bootstrapping (tracking of both ground lines and supply voltage with input signal) is essential for correct operation of input bias compensation, input offset voltage compensation, temperature compensation, F.E.T. switching and common mode rejection.

M23 is a high impedance buffer which looks at the inverting input of M21. The offset of M23 is adjusted so that its input is within 100μV of the input of M21 (the signal). M23 thus functions as a low impedance rail following the signal precisely.

By means of zener diode level shifting M24 and M25 produce outputs tracking +9V and –9V respectively from the bootstrap rail. These rails power the pre-amp M21 and the bootstrap-amp M23 as well as driving the switching to the F.E.T. gates. For example with +15V on the high terminal the +ve supply of M21 is +24V and the –ve supply +6V. This produces excellent common mode rejection.

It should be obvious that this immediately requires a higher supply voltage than the ± 15V stabilized rails provide. With the maximum +20V of signal this means a supply of +30V stabilized is needed for the +BS rail and to provide this nearly 40V is required. A capacitive inverter driven from M26 provides ± 38V from the ± 15V rails.

Zener diodes Z3, Z4 provide levels approximately fifteen volts above and below bootstrap. Emitter followers Q52 and Q53 provide a low output impedance for these rails which power M24 and M25. This is necessary to prevent the voltage rating of M24 and M25 from being exceeded. With signals of less than ± 200mV the output followers Q52 and Q53 are slightly less than the ± 15V stabilized rails.

1.2.3 Drift compensation

Q1 of the preamplifier is a well matched monolithic NPN transistor pair exhibiting minimal voltage drift and low noise characteristics. To compensate for the current gain match of Q1 at different temperatures (approx. 1%/^{o}C), the base emitter voltage is sensed by M2. Its output is linearised by Q2 which has a temperature coefficient similar to that of Q1. Hence the input bias current is kept constant.

1.2.4 Filtering

In $\overline{\text{FILTER}}$ mode, by use of a 5-pole active filter of switchable size, the isolator board has a response to 0.01% in 80mS with an attenuation of 20 dB. In FILTER, it has a response to 0.01% in 350mS with an attenuation of 57 dB. In the $\overline{\text{FILTER}}$ mode, Q46, Q47 and Q48 are switched off and the filter comprises C25, C24, C26, C14 and C19. In the FILTER mode, Q46, Q47 and Q48 conduct thus connecting into circuit C17, C18 and C16. To reduce the effects of dielectric absorption all capacitors on the front end are polypropylene, the remaining effects are compensated by Q58, C37, C36, R81, R82 and R61.

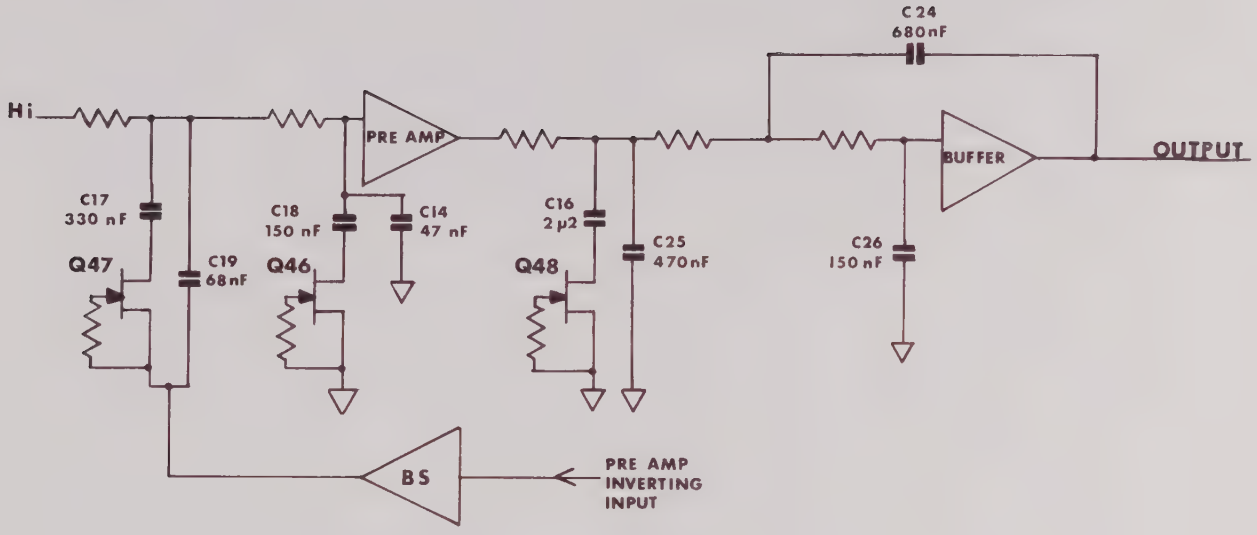


FIG. 1:4 FILTER NETWORK

1.2.5 **Isolator range coding/decoding (Drawing 430010, sheet 1).**

M9 – M14 are optical isolators separating the auto range digital circuits from the isolator circuit. The outputs of M9, M10, M11 form a range code in BCD format. M12 calls up the resistance converter card, M13 the AC card and M14 filter.

Q18 – Q23, Q27 and the resistor diode matrix R182, R189, CR101 – CR140 decode the BCD from M9 – M11 and recode it for the AC card and the resistance card. Q28 – Q30, Q33 – Q37 code the drive to the F.E.T.'s on the DC isolator.

Examining the BCD code more closely:–

Range	M9	M10	M11	Q18	Q19	Q20	Q21	Q22	Q23
10mV	0	0	1	1	1	0	0	0	1
100mV	0	1	0	1	0	1	0	1	0
1V	0	1	0	1	0	0	0	1	1
10V	1	0	0	0	1	1	1	0	0
100V	1	0	1	0	1	0	1	0	1
1kV	1	1	0	0	0	1	1	1	0

In the case of Q18 – Q23 a '1' represents $\approx$+15V and a '0' $\approx$ –15V.

These codes remain the same **whether** DC, AC or Ω is selected. The outputs of the diode matrix following Q18, Q23 are modified by the selections of DC, AC or Ω.

1.2.5.1 **DC coding**

When 10mV is selected the collectors of Q18, Q19, Q23 are at ±15V. Consequently the junction of D127 – D131/R188 is +ve and this turns FET Q43 on, which gives a preamp gain of X100.

Q21 is –ve, which turns Q28 on and in turn Q35. This turns Q37 off. The collector of Q37 is now +ve, turning FET Q44 on, connecting the preamp directly to the output buffer.

When 100mV is selected, the collectors of Q18, Q20, Q22 are at +15V consequently the junction of D117 – D121/R186 is +ve. This turns Q29 off and in turn Q33 off. The collector of Q33 goes +ve and this turns FET Q42 on giving a preamp gain of X10. Q21 is still –ve, thus Q28 is on, Q35 off, Q37 off and FET Q44 on, again connecting the preamp directly to the output buffer.

When 1V is selected neither of the two previous codes are present. Q33 and Q34 are both on, this turns Q36 off and FET Q41 on, giving a preamp gain of X1. Q21 is still –ve, so Q44 is still on.

When 10V is selected, Q20 and Q21 are high. The junction of D132 – D134, D140, R189 is +ve, turning Q28 off, turning FET Q45 on. Q36 is still off. This calls up a preamp of unity again but divides the output by ten before passing to the output buffer.

On both 100V and 1kV, RL1 is pulled in, connecting the 100:1 input attenuator in circuit. Q27 is at +15 when either Q19 is low and Q23 low or Q22 low and Q20 low. Thus on 100V and 1kV the junction of D114 – D116, D147, R197 is high, turning Q26 on, pulling in RL1.

If 10MΩ is incorrectly selected in DC the 1kV range will be called up by the range logic on the analogue side of the opto-isolators.

1.2.5.2 AC Coding

When AC is selected M13 turns Q31/Q32 on. These pull RL1 in, turn Q35, Q37 on and F.E.T.'s Q44/Q45 off. The preamp on the DC isolator is thus totally disconnected from the output buffer M22. This now receives its input via R38 from the AC converter. Note that these actions are effective on AC regardless of the range selected.

The AC converter received 4 lines of coded range information via pins 1,3,5,7.

Range	Pin 1	Pin 3	Pin 5	Pin 7
10mV	0	1	1	1
100mV	0	1	0	1
1V	0	0	0	1
10V	1	0	0	1
100V	0	0	0	0
1kV	1	0	0	0

If 10MΩ is incorrectly selected in AC the 1kV range will be called up by the range logic on the analogue side of the opto-isolators.

1.2.5.3 Resistance Converter Coding

The collectors of Q18 – Q23 are fed directly to the resistance converter without being modified in the diode matrix. However, before the opto-isolators in the range logic an extra range, 10MΩ , is added. The BCD code for this is

M9	M10	M11	Q18	Q19	Q20	Q21	Q22	Q23	
1	1	1	0	0	0	1	1	1	10MΩ

The DC isolator is used on the ohms ranges, with a gain of X1 on all except the 10R range, when it is X10. On selecting ohms, M12 turns Q24 on and Q25 off. This modifies the diode matrix outputs to the DC isolator. Holding Q26 and RL1 off on the '100V' (100k) and 1kV (1MΩ) positions, Q28, Q35 and therefore F.E.T. Q44 are also turned on, coupling buffer to preamp directly.

1.2.5.4 Filter

M14 passes the FILTER command to Q38, turning it on. F.E.T.'s Q46, Q47 and Q48 are all turned on via D1, D3, inserting larger capacitors in the 5 pole active filter of the DC isolator. A line is also taken from Q38 to the AC converter. Filter can be called up, and is effective on DC, AC and OHMS (where it is useful for resistances in the 10MΩ region or where long unscreened leads are used).

1.2.6 Auto Range and Range Selection (Drawing No. 430010, Sheet 3)

Range selection can be made by front panel push button, by remote programming via the rear panel, or automatically by auto range. Function selection can be by either front panel or remote programming.

The basis of range selection is M2, a presettable up – down counter. If AUTO is not selected, the counter is prohibited from clocking up or down and the 3 output lines are similar to the three presettable input lines. These input lines come from M1, a 4 input – 2 way multiplexer. Selections of which 3 inputs are connected to the outputs is controlled by front panel or programme REMOTE function selection. The three outputs of the up – down counter drive opto-isolators M9 – M11 feeding a BCD range code to the DC isolator. (See 1.2.4). M6, a BCD – decimal decoder, together with M5 and Q8 – Q12 provide remote range indication for the BCD output option and range decimal point drives for the analogue to digital converter display.

When autorange is selected (AUTO) two modes are possible. If there is an overload on the range in use (i.e. $\geqslant$ 20,000 digits) an UP command will come from the digital board via J3 – 13 and the counter will clock up one range. After a fixed period ($\approx$ 100mS in FILTER and $\approx$ 500mS in FILTER) the counter will either remain in a fixed state if the reading is on scale or if still overloaded will clock UP again. This will continue until an on scale reading is achieved, or the highest range reached. Gating on M7 prevents clocking beyond the top range. Alternatively, if the reading is too small for reasonable accuracy on the range in use (i.e. $<$ 1000 digits) a DOWN command will come from the digital board via J3 – 14 and the counter will clock down one range. Again, after a fixed period, the counter will either remain in a fixed state if the reading is between 1000 and 20,000 digits or if still under scale, will clock DOWN again. This will continue until a reading of $>$1000 digits is achieved or the bottom range reached. Gating on M4 prevents clocking beyond the bottom range.

An identical quad 2 way multiplexer M8 is used for function selections. Front panel or remote programming again selects which information to transfer.

M3, Q7, Q13, Q14, Q17 decode the multiplexer (M8) outputs into AC, DC, OHMS and FILTER which connect to the analogue-to-digital converter via J3 and to the DC isolator via opto-isolators M12 – M14 (only $\overline{\Omega}$ and $\overline{AC}$ are transmitted, DC is $\overline{\Omega}$ and $\overline{AC}$).

There are two methods of remote selection. A remote programme link is fitted at the factory and EITHER front panel OR programming can call up REMOTE. If this link is removed, then only the front panel button can call up REMOTE and the programme line pin 12 becomes an output flag indicating $\overline{\text{REMOTE}}$.

1.2.7 Models 01 and 11 AC Converter

The Model 01 AC converter is an electronic True RMS AC to DC converter operating over a bandwidth of 30 Hz to 1MHz and incorporating 6 ranges from 10mV full range to 1000 volts.

The circuitry is on one printed circuit assembly which plugs into the underside of the DC isolator mother board assembly. There are two main circuit sections, the preamplifier (Drawing No. 430016, Sheet 1) which buffers and ranges the signal in order to present ·9 volts full range to the AC to DC converter section (Drawing No. 430016, Sheet 2).

1.2.7.1 Preamplifier

The simplified diagram Fig. 1:5 shows the essential features of the preamplifier and scaling circuit. For the purposes of explanation the same symbols are used (black triangular contact normally "mode", white contact normally "open") regardless of whether the switching is accomplished electronically (F.E.T.) or by means of relay contacts. In Fig. 1:5 all switching is shown in the 1V range position.

The various switching combination for the different ranges are as follows:–

VOLTS RANGE	OVERALL VOLTS GAIN	RELAY K2	F.E.T. Q2	F.E.T. Q4	F.E.T. Q3	F.E.T. Q5
10mV	90	6 – 5	OFF	OFF	ON	OFF
100mV	9	6 – 5	OFF	OFF	ON	ON
1V	·9	6 – 5	OFF	ON	OFF	ON
10V	·09	6 – 5	ON	ON	OFF	ON
100V	·009	6 – 7	OFF	ON	OFF	ON
1000V	·0009	6 – 7	ON	ON	OFF	ON

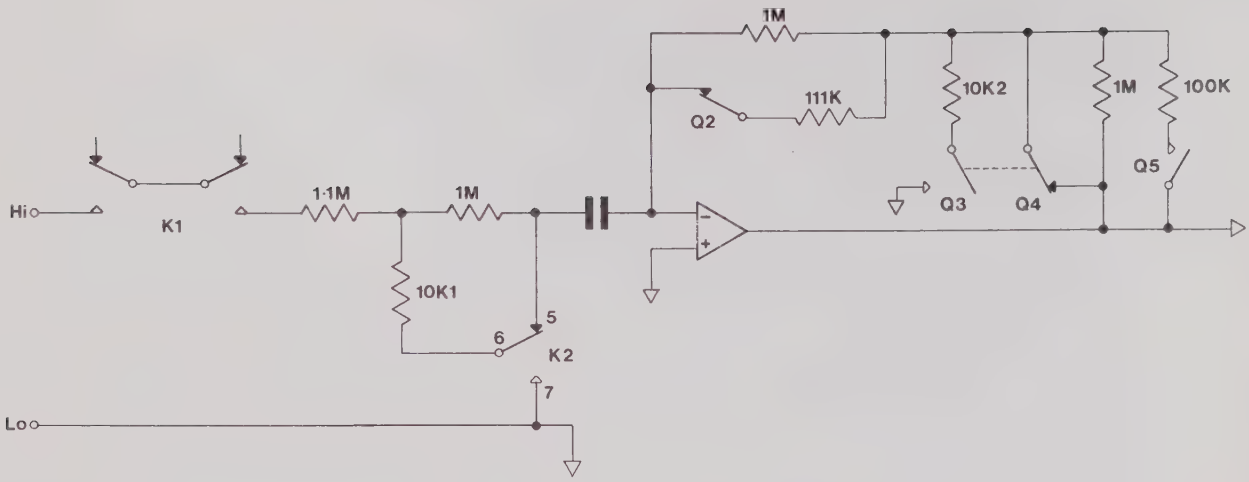
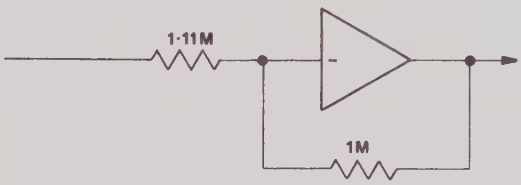


FIG. 1.5

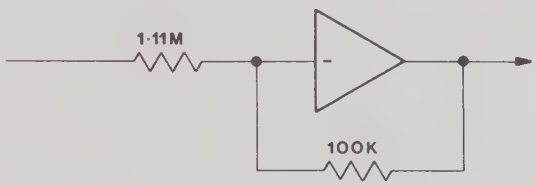
SIMPLIFIED A.C. CONVERTER PREAMPLIFIER

Although the reader could, no doubt, puzzle out the different circuit configuration on each range, it will be quicker to simplify the circuit still further and to show separate drawings for each RANGE setting as shown in Fig. 1:6.

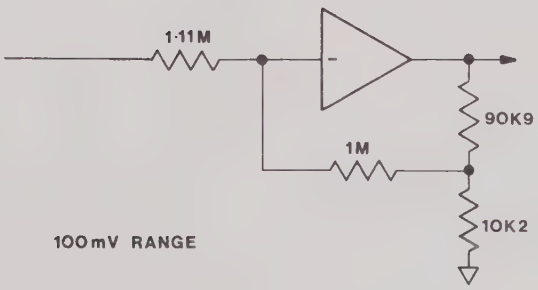
No e that in the model 11 AC converter the 100mV range is omitted, but all other circuit descriptions are similar to the model 01.



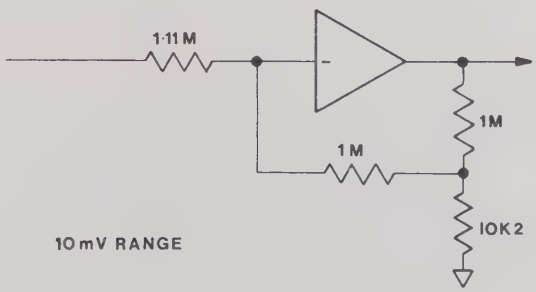
1 VOLT RANGE



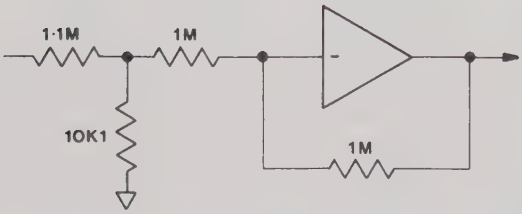
10 VOLT RANGE



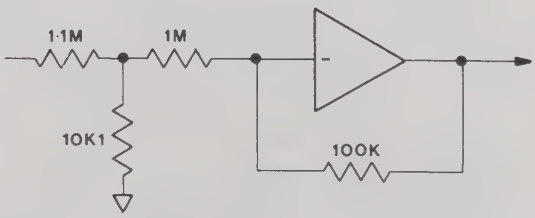
100mV RANGE



10mV RANGE



100 VOLT RANGE



1000 VOLT RANGE

FIG. 1.6

A.C. PREAMPLIFIER GAIN CONFIGURATIONS

Having grasped the basic essentials reference should be made to Circuit Diagram No. 430016, Sheet 1.

Relay K1 is energized when AC is selected and directly connects resistor chain R3 – R6 to the Hi input terminal. The four resistors total 1·11 MΩ and are capable of dissipating 2 Watts. Capacitors C2, C3, C4 and R7 provide frequency compensation to increase the accuracy at high frequencies. For the purposes of this description no further reference to frequency compensation will be made although, of course, every gain defining resistor is frequency compensated.

The signal current passing through R3 – R6 either flows into the virtual earth (TP1) of the preamplifier via R10 and C8 or, if K2 is energised, 99% of the current is shunted to common providing the ÷ 100 condition required on the 100 and 1000 volt ranges.

The preamplifier itself is of the inverting type, is of high bandwidth and has remarkably low offset drift characteristics. Q6, Q7 and Q10 form a very high bandwidth unity gain buffer. Q6 is a dual F.E.T. operating in a unique differential mode such that each half tracks thermally. M1 is a fast operational amplifier. F.S.V. resistors R51 and R52 are selected to offset M1 such that its offset drift is very low, R41 and R42 such that the offset drift of Q6 is very low and R34 and R35 to provide zero output offset of the whole preamplifier. This is finely adjusted by R36.

The feedback network has been deescribed previously (see Fig. 1:5 and 1:6). Note that the gain defining resistors are associated with trim adjust potentiometers and that where this is the case the compensating capacitor network is also adjustable. Two "twisted-wire" capacitors are also incorporated for very fine frequency flatness adjustments.

The preamplifier is AC coupled at its input with a 1000 volt capacitor allowing AC measurements in the presence of very high DC bias potentials. Although the AC gain is high on the millivolt ranges C22 and C23 limit the DC

1.2.7.2 RMS Converter (Circuit Diagram No. 430016, Sheet 2)

The RMS Converter takes the scaled AC signal from the preamplifier and converts it to an equivalent DC signal suitable for Analogue-to-Digital conversion. The conversion technique is electronic true RMS sensing as shown in the simplified block diagram Fig. 1:7.

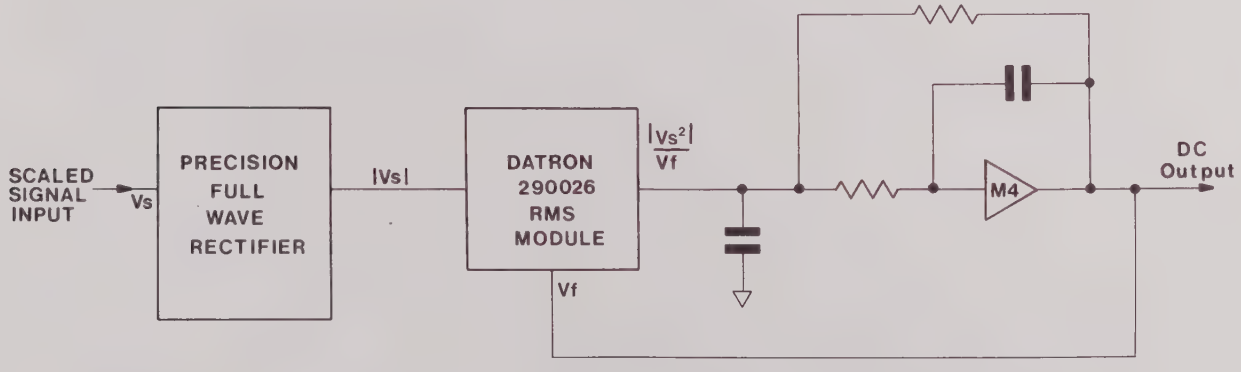


FIG. 1.7

TRUE R.M.S. CONVERTER

With reference to Fig. 1:7 the sections are explained except for the circuitry around M4 which forms a 2-pole active filter with approximately 60 dB rejection at 40 Hz (referred to input).

Mathematically, the description is as follows:–

$$\text{Output Voltage, Vo} = \frac{\overline{|Vs|^2}}{Vf}$$

where bar notation indicates overrange.

$|Vs|$ is the rectified form of the input signal Vs.

Since the loop is closed:

$$Vo = Vf$$

therefore

$$Vo^2 = \overline{Vs^2} \qquad (Vs^2 = |Vs|^2)$$

$$Vo = \sqrt{\overline{Vs^2}}$$

Thus Vo is the true RMS value of Vs.

With reference to Drawing No. 430016, Sheet 2; M2 and M3 form the full-wave rectifier which is of the summing type, that is, M2 is a precision half-wave rectifier inverter, the output of which is summed with the non-inverted signal, with a weighting of 2:1, at the input of M3. This forces a full-wave rectified current to flow in RMS module M6. Although the simplified block diagram of Fig. 1:7 implies that the RMS module operates with voltages, it in fact operates on currents both in and out. Trim resistor R61 balances the rectifier such that a non-symmetrical waveform provides the same output whether inverted or not.

The output current from the RMS module passes into filter-buffer M4 and is converted to the output voltage. Q15 and Q16 switch in additional capacitors for operating in the FILTER mode down to 40 Hz or lower. M5 is a voltage to current converter which provides a feedback current to the RMS module which is proportional to the output voltage. R98, R109, R115 are zero adjusts for M3, M4, M5 respectively, R67 is an overall gain adjust and R70 is a high crest factor gain adjust. All these components are coarsely adjusted with FSV resistors. Q23 is turned on in AC and off in the other functions and it switches the output of the AC converter into the output buffer M22 of the DC Isolator.

1.2.8 Resistance Converter · Option 02 (Drawing No. 430008, Sheet 1)

This is a true 4 wire measurement and incorporates an active guard for in-circuit measurement. In many cases, 2 wire measurement is adequate and more convenient: a front panel switch is incorporated to provide for this.

The instrument functions by measuring the voltage across an unknown resistance with a known, constant, current flowing in it.

As can be seen in Section 5.4 of the Operating Manual, 4 wire measurement can eliminate the effects of lead resistance. However, for short leads of 24/0.2mm wire, the few tens of milliohms error when measuring greater than 100 ohms soon become negligible; from this point on, 2 wire measurement becomes more attractive. Referring to Drawing No. 430008, the converter is in two parts: a constant current source covering 6 decades from 10mA – 100mA and a low drift voltage follower. Itshould be noted that when the resistance converter is fitted the DC isolator Lo is no longer directly connected to front panel Lo, but goes via RL1 on the resistance converter. On DC, isolator Lo connects to front panel Lo. On Ohms, the front panel Lo is connected to the –ve input of M3, the +ve input of which is referred to DC isolator Lo. (This remains reference common). M3 together with output follower Q9, will thus apply a voltage at 1+ such that the voltage at front panel Lo is reference 0 + offset M3 (which is zeroed to $< 10\mu V$).

Consider 2 wire measurement for ease of explanation: I+ linked to Hi, I– linked to Lo, the unknown resistance between Hi and Lo. A constant current flows from Hi to Lo through the unknown resistance. The Lo terminal is maintained at $0 \pm < 10\mu V$. The Hi terminal (DVM isolator input) is, I constant x R unknown, above Lo. As long as the error on Lo is small referred to reference 0, the DVM will read the correct resistance. The voltage offset error is kept small (< 1 digit) by compensating M3 in the same manner used for M21 on the isolator. (See Section 2, Maintenance).

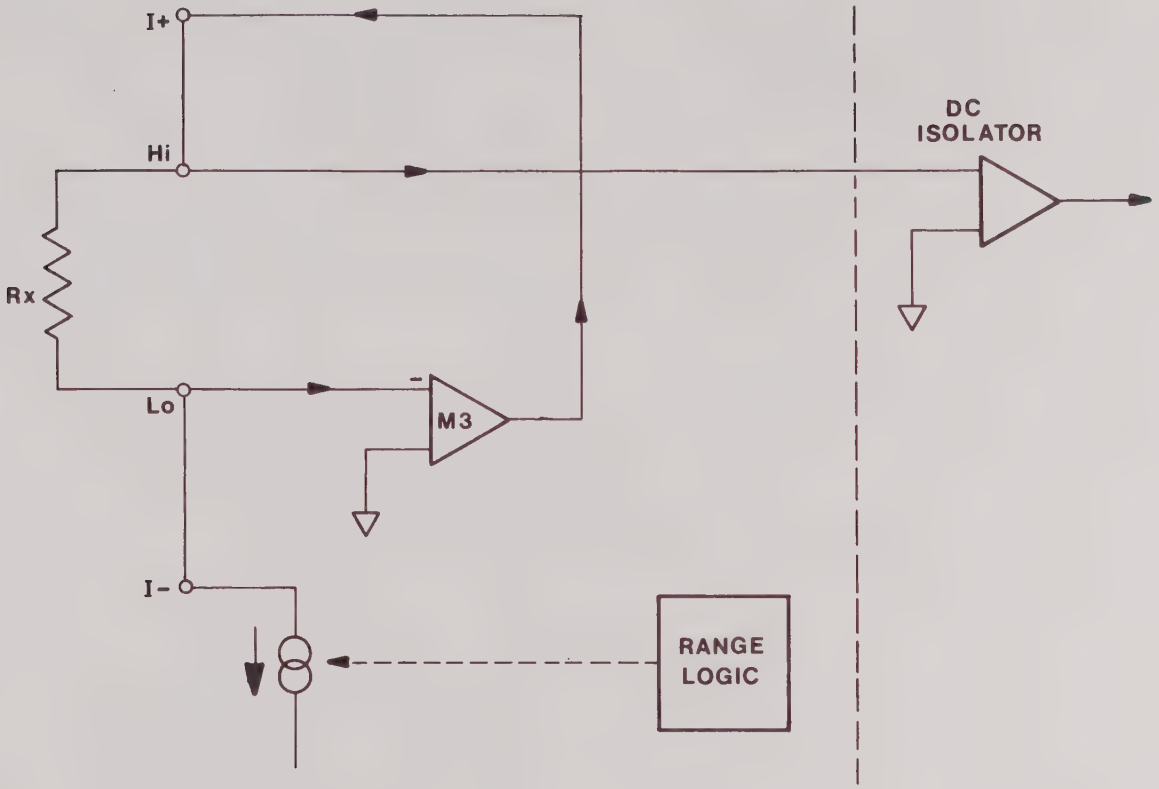


FIG. 1.8

SIMPLIFIED Ω SCHEMATIC

Seven decades of ohms ranges are provided by 6 ranges of current and 2 ranges of isolator voltage gain. The diode switch matrix on the isolator board provides 7 lines of information in BCD code. A small matrix on the Ω card provides gate drive for 6 current selector F.E.T.'s (Q2 – Q5, Q7, Q8) and for F.E.T. Q6, used for leakage reduction. M1 converts the –5V reference voltage from the digital assembly into a current of 500μA flowing in R5. R5, M2 and the switched resistors chain R6 – R54 form a current mirror: the current flowing in the chain on the right of M3 is equal to the current flowing in R5 on the left of M3 multiplied by the ratio of the right hand resistor to R5. Put even more simply, the voltage across R5 must equal the voltage across the right hand chain + offset voltage of M2. Thus a fixed voltage difference appears across the resistance chain; by varying the value of resistor, the current is varied selecting tappings on the chain.

The various currents produced are:–

		F.E.T.'s ON
10R	10mA	Q2
100R	10mA	Q2
1kΩ	1mA	Q3
10kΩ	100μA	Q4
100kΩ	10μA	Q5
1MΩ	1μA	Q6 Q7
10MΩ	100nA	Q6 Q8

4 basic currents are provided and a 1000:1 attenuator used with two of these currents provides two more ranges.

If difficulty is experienced in understanding how the 2M/2k functions as a current divider, remember that the point the 2M is connected to is I– and this will be at most only a hundred ohms from Lo. Lo is maintained within a few μV of ref. 0 and the 2k is taken to the ref. 0. Thus the 2M is in effect shunting the 2k and the same voltage therefore exists across the 2M as across the 2k. Q6 is switched in when Q7 and Q8 are on, to sink gate leakage currents from Q2, Q5 to ground.

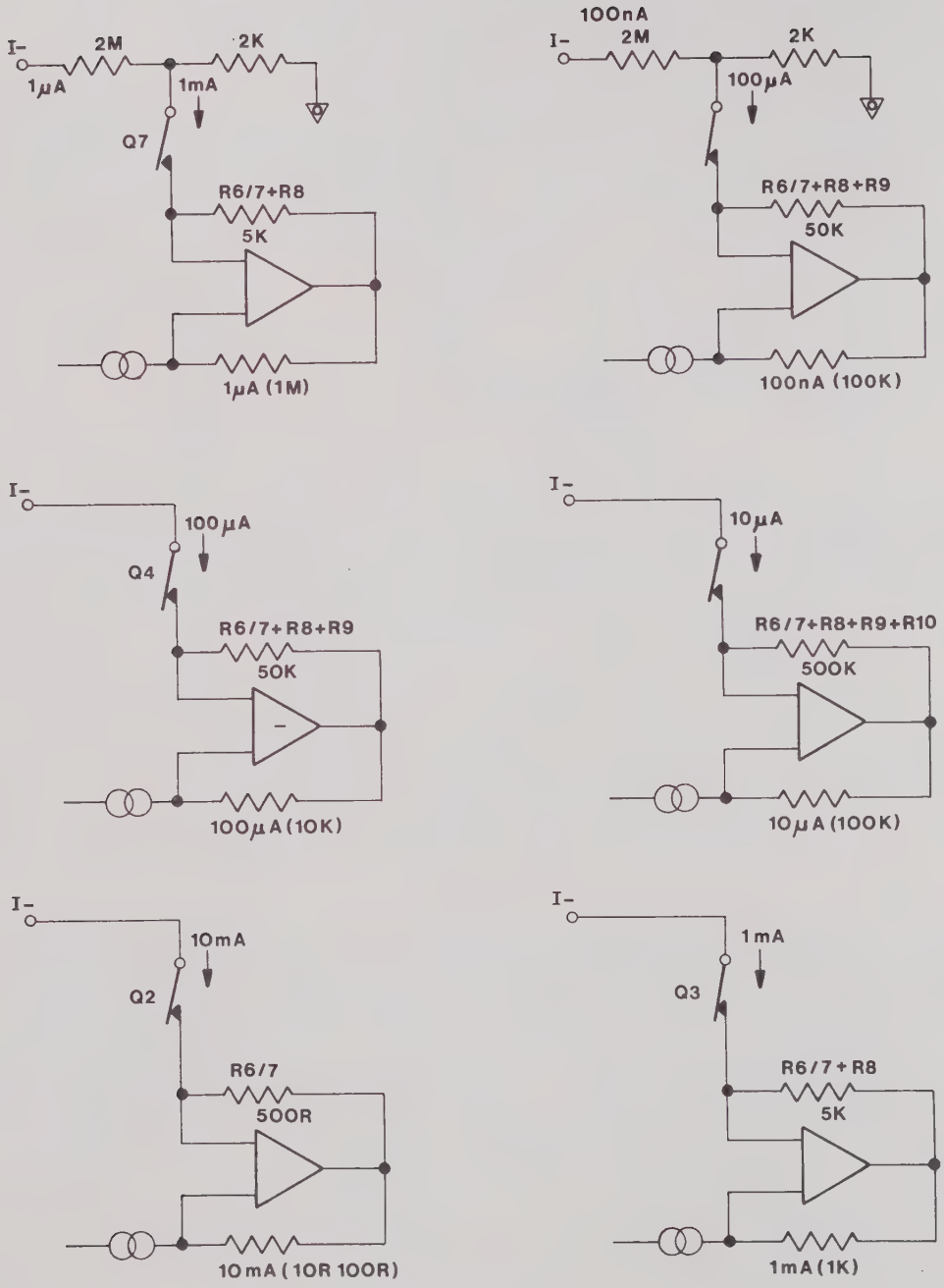


FIG. 1.9

SIMPLIFIED Ω CURRENT SWITCHING

Protection from overload in the current leads is achieved by positive temperature coefficient thermistors R47 (in the I+ lead) and R48 (in the I– lead). Diodes D31 – D34 and zeners D36, D37 prevent excessive voltages from reaching the current generator or the voltage follower output. Protection is such that 240V r.m.s. may be applied between I+ and I– or I+, I– to ohms guard or Lo to ohms guard. Following the application of such an accidental overload the PTC resistors R47, R48 have to cool down and this may take several minutes.

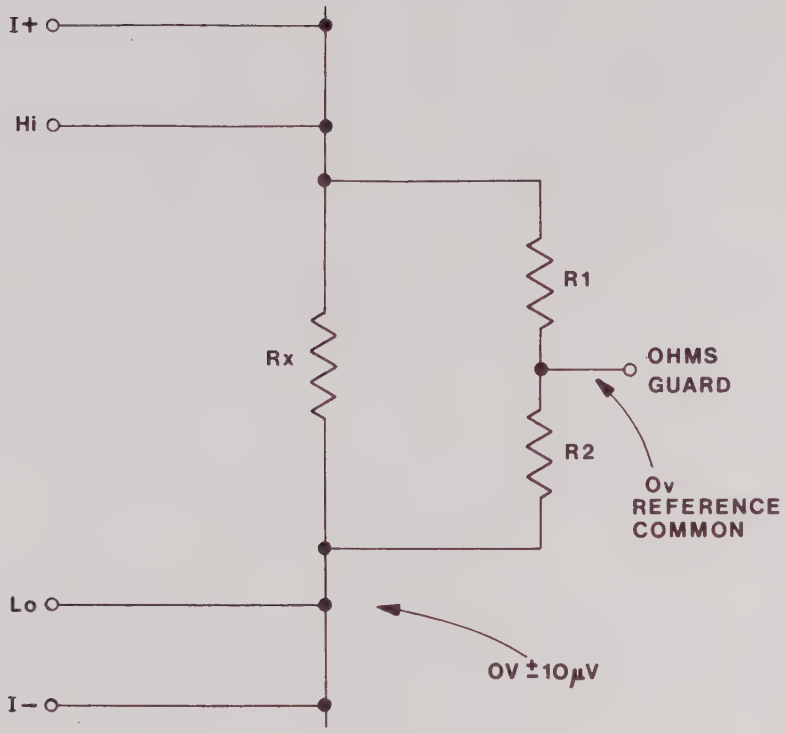


FIG. 1.10
Ω GUARD

The use of ohms guard permits in circuit measurement of resistors, provided shunt paths are greater than 200R and a suitable tapping point is available. Consider Fig. 1:10 Ω Guard is reference 0, Lo is, as previously explained actively maintained within a few μV of ref. 0. Thus there is no voltage across R2 and consequently no current in it. R2 can cause no measurement error. Thus all the constant current because it cannot flow in R2, must flow in the unknown resistance. Voltage follower M3 will simply pass more current into R1 from the I+ terminal until the selected current for the particular range flows through Rx.

1.3 ANALOG TO DIGITAL CONVERTER

Assembly Drawing No. 409120A.

Circuit Diagram No. 430004.

1.3.1 Analog Section

1.3.1.1 General

Section 1.3 and Fig. 1:3 in the Operating Manual give a very basic description of the principles of dual-slope integration. This section covers in more detail the integration as performed by the 1041 Voltmeter. Fig. 1:11 is a block diagram showing the essentials of the analog section of the A – D Converter. The two-way switches are in fact field effect transistors (F.E.T.'s) switched by diode logic and flip-flop circuits. Fig. 1:11 shows the circuitry in the RESET state, waiting for the SIG pulse.

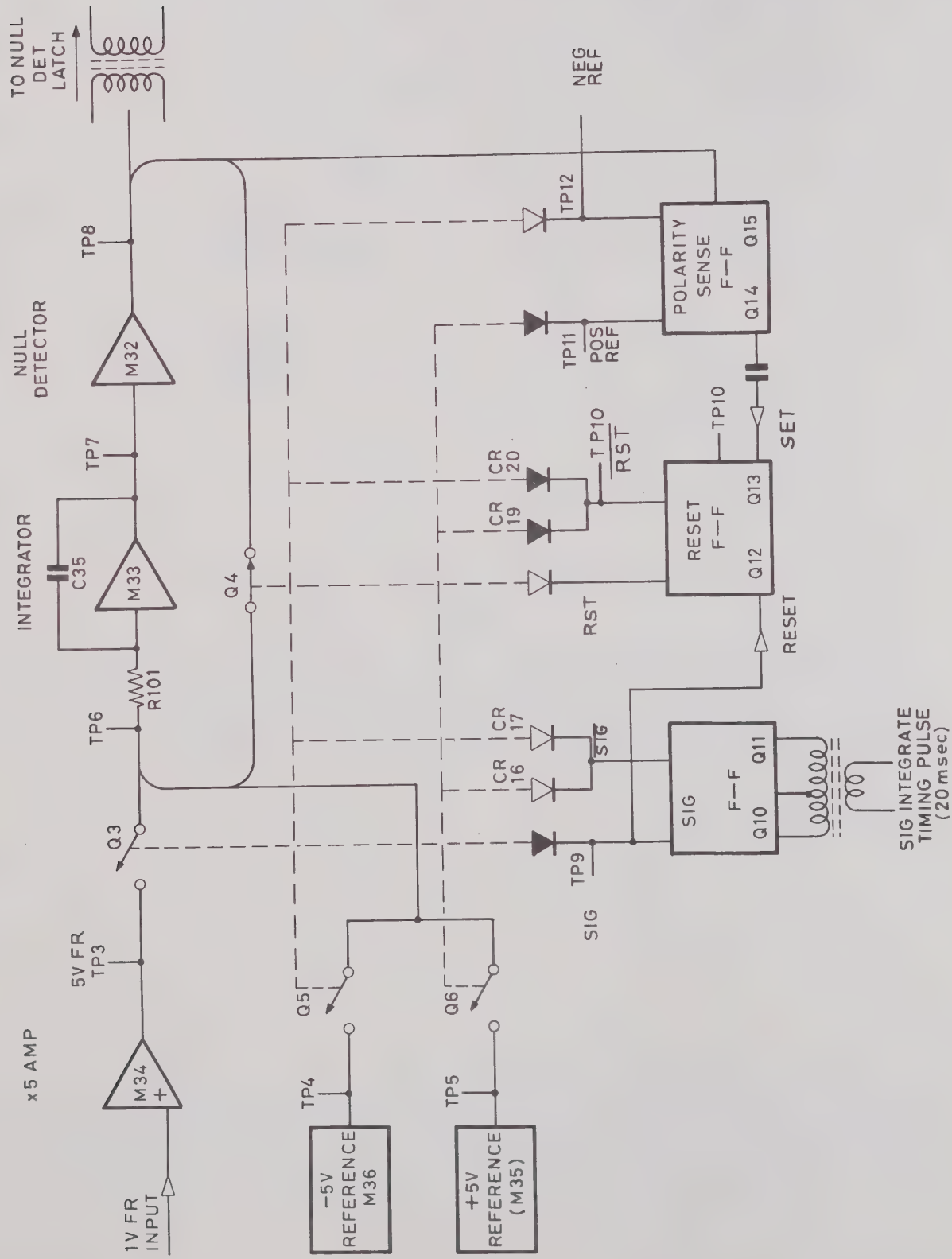


Fig. 1.11 Dual-slope integrator switching

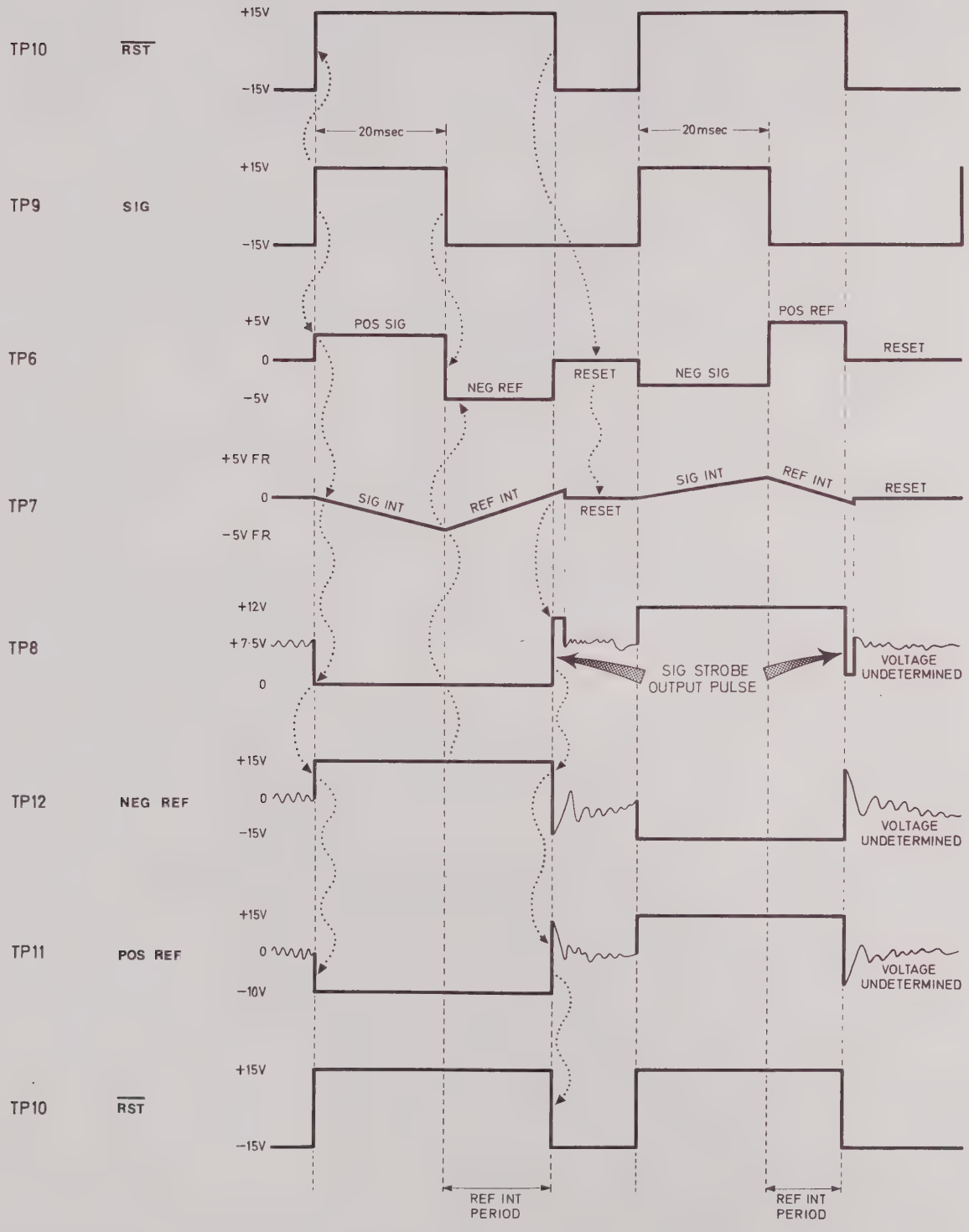


Fig. 1.12 Integrator timing diagram

As explained in Section 1.3 of the Operating Manual, the input signal is applied to an integrator for a set period of 20mS, and the charge acquired by the integration capacitor during that time is proportional to the amplitude of the applied voltage. The capacitor is then discharged to zero volts by connecting the Integrator to a precise reference voltage; the length of time the reference voltage has to be applied in order to reach zero volts is measured by digital circuitry, and is proportional to the amplitude of the input signal.

The sequence of operations detailed in the following paragraphs should be read with reference to the timing diagram Fig. 1:12 and the circuit diagrams. The timing diagram shows first a positive input signal followed by a negative signal of smaller amplitude.

1.3.1.2 Signal Integrate Period

The 1 volt full-range input signal from the DC Isolator board is amplified to 5 volts full-range by M34 and appears at TP3.

A signal integrate period is initiated by the positive-going edge of a timing pulse from the digital part of the circuit via TR2. This signal sets the SIG F/F comprising Q10 and Q11 driving TP9, SIG, to its positive state. This signal switches F.E.T. Q3 on and also resets the RESET F/F. $\overline{\text{SIG}}$ from Q11 being in its negative state inhibits the reference switching lines via diodes D16 and D17.

Q3 being switched on enables the input signal (of some value less than 10 volts) to appear at TP6 and be applied to the virtual earth inverting input of the integrator M33 via R101. If the signal at TP6 is positive then the output of the integrator at TP7 will move off negatively. This voltage is greatly amplified by the Null Detector M32, the output of which is limited by diodes D9 and D10 giving a very fast edge at the output for a small departure from zero input.

The Null Detector output voltage at TP8 sets the POLARITY SENSE F/F which will enable selection of the appropriate 5V reference during the reference integrate period.

Throughout the Signal Integrate period the integrator capacitor continues charging at a rate proportional to the input voltage.

1.3.1.3 Reference Integrate Period

At the end of the 20mS timing pulse from the digital section, the SIG F/F is reset. TP9 goes to its negative state turning Q3 off which removes the input signal from the integrator. $\overline{\text{SIG}}$ goes to its positive state switching diodes D16 and D17 allowing either Q5 or Q6 (as determined by the state of the POLARITY SENSE F/F) to switch on.

Thus a reference signal of opposite polarity to the input signal is applied to the integrator to discharge the capacitor. The reference integration period required for discharging the capacitor to zero volts will always be less than 40mS (except with an overload signal) and the instant of zero crossing is sensed by the Null Detector.

In order to overcome the problem of uncertainty near zero a small proportion of the reference voltage selected by the reference polarity detector Q14, Q15 is fed forward to bias the null detector. This means that even with zero input signal there is a small reference ramp lasting for a period of time determined by the amount of feedforward (set by R106). This is about 7μS and has the advantage of ensuring that a null detector pulse cannot occur at the same time as the maximum digital noise occurs, i.e. at the end of SIG. Thus for zero input the display will read several digits and this is compensated for by holding the clock for a few counts during the reference period.

When the zero crossing is sensed by the Null Detector a pulse of about 1mS duration appears at TP8, the leading edge of which is fed via pulse transformer TR3 to the Null Detector latch in the digital part of the circuit.

1.3.1.4 Reset Period

The pulse at TP8 changes over the POLARITY SENSE F/F and this sets the RESET F/F driving TP10 $\overline{\text{RESET}}$ to its negative state. This signal inhibits the reference switch lines via diodes D19 and D20, switching Q5 or Q6 off and removing the reference voltage input to the integrator.

RESET in its positive state via D18 turns Q4 on, completing the feedback loop so that any residual charge from the previous reading cycle is removed from the integrator capacitor C35. The circuit is thus reset ready for the next timing pulse.

1.3.1.5 References

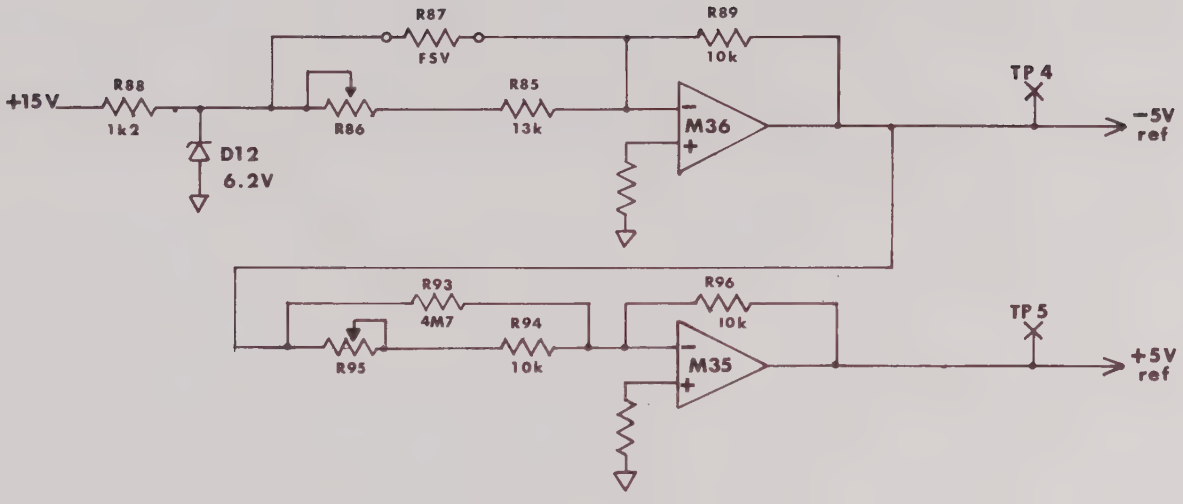


FIG 1.13 REFERENCE CIRCUIT

Fig. 1:13 shows the circuitry for producing the stable +5V and –5V reference voltages. The stability of the reference is dependent upon the inherent stability of the reference zener D12.

To obtain the +5V reference required, inverting amplifier M36 is used with R87 and trimming pot R86 to adjust the output to –5V. Similarly another inverting amplifier M35, having unity gain, and trimmed by R95 is used to produce the +5V reference.

1.3.2 Digital Section

The simplified block diagram below illustrates the general arrangement of the digital circuitry.

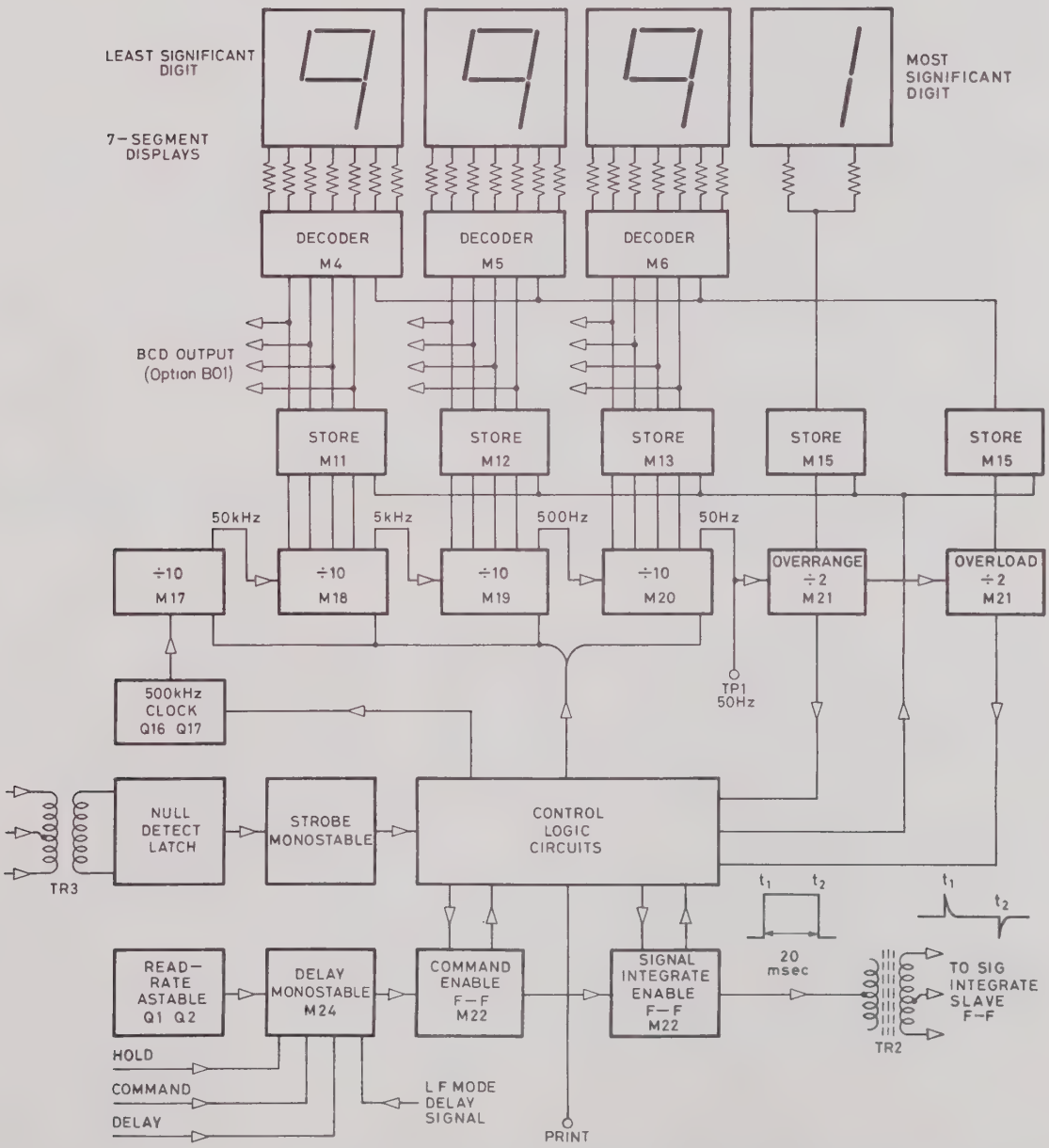


Fig. 1.14 Simplified diagram of digital circuit

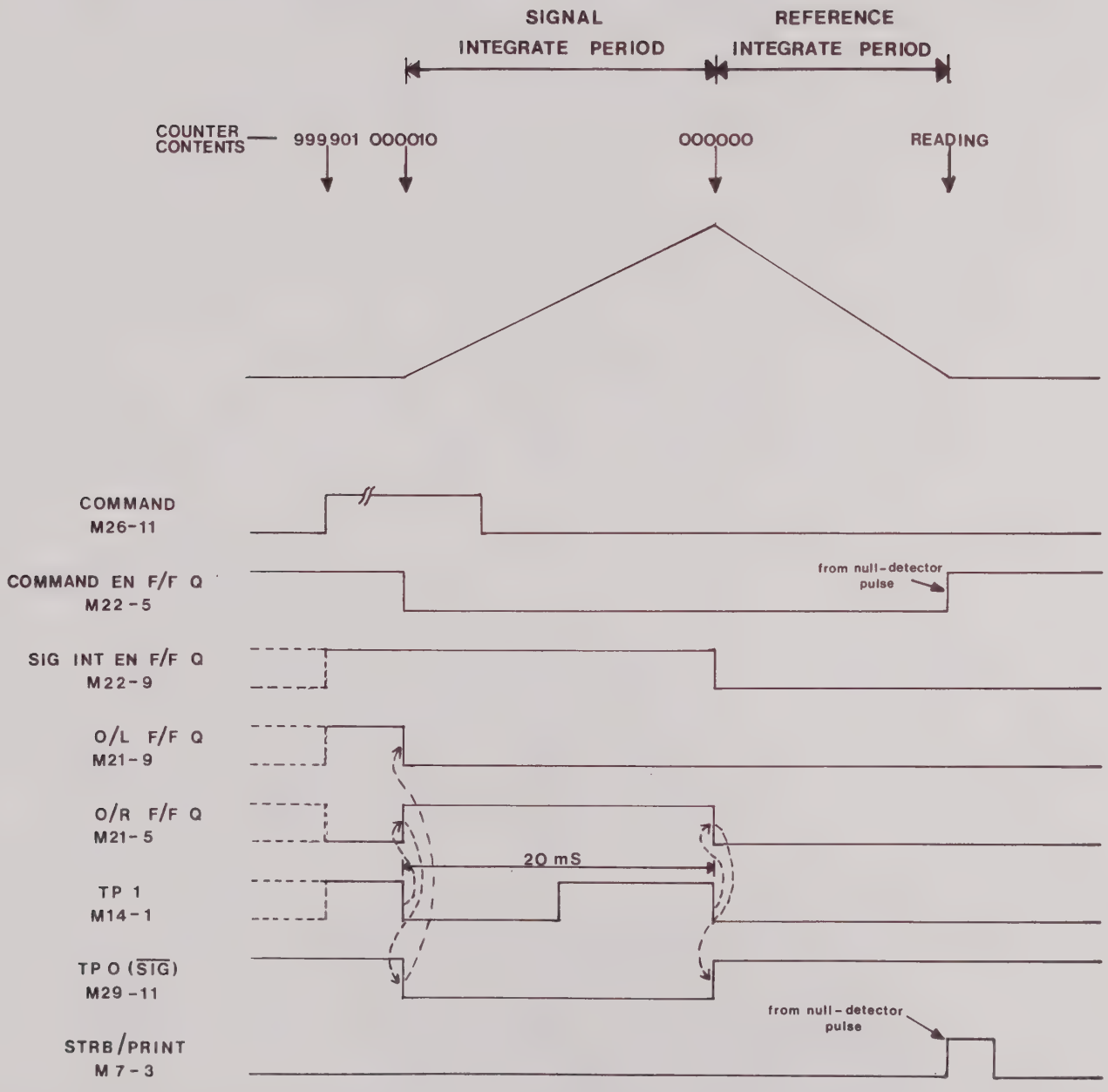


FIG 1.15 DIGITAL SECTION TIMING DIAGRAM

1.3.2.1 Command

In normal operation the read/rate astable (Q1 and Q2) provides commands 3 times/sec to the control logic. A null detector pulse, produced at switch-on at the end of a cycle, sets the Command Enable F/F which allows the commands through to the control logic.

Upon receipt of a command, the decade counters M17 – M20 are preset to 9, the overrange F/F is reset and the overload F/F is set, so the count is

9 9 9 9 0 1

NOTE: In this and all subsequent explanations the least significant digit is shown on the left.

The Signal Integrate Enable F/F is also set.

1.3.2.2 Signal Integrate Period

The first pulse from the 500 kHz clock (Q17 and Q17) changes the states of the decade counters and overrange F/F.

The change in state of the overrange F/F causes TP0 ($\overline{SIG}$) to go to 0 indicating the start of the signal integrate period.

In the digital circuitry this holds the overload F/F reset and thus the count is:–

0 0 0 0 1 0

$\overline{SIG}$ also resets the command enable F/F to inhibit any further commands.

$\overline{SIG}$ is fed via TR2 to the analog circuits where it enables the connection of the input signal to the integrator.

1.3.2.3 Reference Integrate Period

After 10000 clock pulse (20mS) the overrange F/F resets and as the overload F/F is still held reset the count is now:–

0 0 0 0 0 0

TP0 ($\overline{SIG}$) returns to a logic '1' indicating the end of signal integrate period and in the analog circuitry this enables the correct reference to be connected to the integrator.

The signal integrate enable F/F is reset and the overload F/F reset is released.

The positive edge of $\overline{SIG}$ is slightly delayed to hold the counter for the first ten pulses of the clock in the reference period to compensate for the feed-forward in the analog circuit.

The counter is then released to count freely from 0 0 0 0 0 0 to time the reference period.

1.3.2.4 Display and Reset

One of the following four conditions can occur:–

i) Null detector pulse received within 20 mS – less than full range count.

Counter contents:– X X X X 0 0

The null detector pulse is received from the analog circuit via TR3 to trigger the Strobe Monostable and clock the value in the counters into the latches M10 – M13, M15. The values are then decoded and routed to the display board.

STRB and PRINT signals indicate that data is ready for use by the display or BCD outputs.

The command enable F/F is set to allow the next command pulse to initiate a new measurement cycle.

ii) Null detector pulse received between 20 mS and 40 mS – overrange count.

Counter contents:– X X X X 1 0

The sequence of events is the same as detailed in i) but the overrange F/F is set.

iii) Null detector pulse received between 40 mS and 60 mS – overload count.

Counter contents:– X X X X 0 1

The sequence of events is the same as detailed in i) but the overload F/F is set which blanks the display.

iv) No null detector pulse received before 60 mS – invalid or fault condition.

Counter contents:– 0 0 0 0 1 1

In this case protection logic is used to pre-set the command enable F/F to terminate the invalid cycle and allow a new measurement cycle to be initiated.

The above sequence is summarized in tabular form for reference in Fig. 1:16.

COUNTER SEQUENCE SUMMARY

(X = Undefined Digit)

	Least Significant DECADES				Most Significant BINARY Overrange	Overload
Initially	X	X	X	X	X	X
COMMAND sets to (Then starts count)	9	9	9	9	0	1
TIME (COMMAND +1 clock pulse) Start of SIGNAL INTEGRATE	0	0	0	0	1	0
TIME (20 msec later) i.e. 10 000 clock pulses End of SIGNAL INTEGRATE Start of REF. INTEGRATE	0	0	0	0	0	0
Null Detects at end of REFERENCE INTEGRATE						
Full Range	X	X	X	X (ILLUMINATED)		0
Full Range	X	X	X (ILLUMINATED)	X	1	0
Overload	X	X	X	X		1

FIG. 1:16

1.3.2.5 External Control

The internal commands from the read/rate astable may be inhibited by the $\overline{\text{HOLD}}$ external signal. A reading is then initiated by generating a command via the $\overline{\text{COMMAND}}$ line and the Delay monostable M24. A zero on the $\overline{\text{DELAY}}$ line will automatically insert a delay equal to the settling time of the analog circuitry depending on whether it is switched to NORMAL or FILTER.

1.4 DISPLAY (Assembly Drawing 400026, Circuit Diagram 430007).

The Display comprises seven segment cold cathode (Beckman – Sperry) displays operating from a 180V DC supply line. The complete assembly is mounted on the front of the A – D assembly and at right angles to it. The segment drive lines from the decoder drivers on the A – D pass via the soldered right angle connector directly to the pins on the displays. Decimal points DP2, DP3 and DP4 are also driven directly from the A – D assembly. The remaining decimal point, DP1, the overrange digit and the + and – indicators are driven from high voltage buffer transistors Q8, Q7, Q5 and Q6 mounted on the display board. These transistors are driven from TTL levels. The "V" and "mV" indicators are incandescent long life lamps driven directly by M1 which decodes signals presented by the A – D assembly.

1.5 POWER SUPPLIES

1.5.1 General

The mains transformer and power supply components are mounted near the rear of the Analog-Digital Display board. Transformer TR1 is of toroidal construction with a split primary comprising two 115-volt windings. These are intended for either series or parallel connection, depending on the supply voltage. An earth screen is interposed between the primary and secondary windings to minimize electrostatic coupling; this is grounded to supply-line earth. Completely separate from the earth screen, and isolated from all windings, a further electrostatic screen is fitted to act as a Guard Shield.

1.5.2 ±15V, + 5 V Supplies

There are three secondary windings from TR1, each with its separate full-wave bridge rectifier and solid-state regulator. Outputs from regulators M38 and M39 provide a –15V – COMMON – +15V DC supply, while an 8-volt r.m.s. winding is used with rectifier W1 and regulator M37 to give a separate +5 line. The regulators used are all capable of delivering a 1-ampere output, with foldback current limiting and thermal shut-down protection built in. No damage results to them even under short-circuit conditions.

1.5.3 180V Supply

The 180V supply line is located on the display board as a DC to DC converter stepping up from the 5V supply. The advantages of this method are two-fold, firstly it localises the presence of high voltages and secondly it is automatically regulated since the 5V line is regulated. Transistors Q1 and Q2 form an astable multivibrator driving Q3 which switches one side of the primary of the toroidal transformer T1 to zero volts at an approximate 20 kHz rate. The Centre-tap connects to +5V via R1 and C1 and the other half of the primary drives CR3 which acts as an efficiency diode. W1 rectifies the high voltage square wave output, C1 smoothes out any spikes present and R6 and R8 feed the anodes of the display modules DM1 and DM2.

1.6 OPTIONS

1.6.1 B01 and B01a BCD Outputs

Assembly Drawings 400348/400058
Circuit Diagrams 430348/430042

These options comprise a printed circuit board which routes all data output and command signals between the internal circuitry and the 50-way Amphenol BCD connector located on the rear panel of the instrument. Refer to the Operating Manual for details of the pin connections.

1.6.2 B02 and B02a BCD Outputs

Assembly Drawings 400349/400023
Circuit Diagrams 430349/430002

These options comprise a printed circuit board which routes all signals as in Option B01. Each line is input to a 3-state gate which is disabled by a logic '0' on the $\overline{\text{PRINT INHIBIT}}$, Pin 42, input control line. This forces all outputs to a high impedance OFF state, which effectively disconnects all instrument outputs from the lines they are connected to and inhibits all input commands.

1.6.3 AO1 Analog Output (located on DC Isolator Board)

The analog output option presents a 0–2V output via the connector located on the rear panel of the instrument. The output is protected against accidental overload by fuses in both Hi and Lo lines. Refer to the Operating Manual for details of the pin connections.

1.6.4 RO1 Parallel Rear Input

This option comprises a socket on the rear panel which is wired in parallel to the input terminals on the front panel. Refer to the Operating Manual for details of the pin connections.

1.6.5 FO1 Fast Read Rate

This option decreases the settling time of the input circuitry to allow up to 20 readings per second. On the DC Isolator C23, C24 and C25 are removed, C15 is changed to a 3300 pf capacitor, and C25 is changed to a 1000 pf capacitor. On the A – D Converter C20 is changed to a ·33μf capacitor.

This option degrades the AC Normal Mode Rejection.

1.6.6 SF1 Superfast Read Rate.

Assembly Drawing 400258.
Circuit Diagram 430258.

This option, which is fitted in conjunction with BO1 and FO1, reduces the integration period to 2mS, thereby allowing a read rate of 150 per second at full range (120/sec at full scale).

1.6.7 PO1 Remote Programming.

This option comprises a printed circuit board which routes all the external control signals from the 14-way amphenol socket on the rear panel to the internal circuitry. Refer to the Operating Manual for details of pin connections.

1.6.8 External Reference (Ratio)

Under normal operation the references for the dual slope integrators are provided internally on the A – D P.C.B., and an option is available for using an external reference when required.

The use of an external reference enables ratio measurements of the $^{V}DC/^{V}EXT\ REF$, $^{V}AC/^{V}EXT\ REF$ and $OHMS/^{V}EXT\ REF$ to be made.

Provision is made for switching to an external reference by operating the 'EXT REF' switch on the rear panel and connecting the external reference voltage to the rear panel socket. The external reference may also be selected by the remote programming pin 7 when the rear panel switch is in the 'INT REF' position. When the external reference has been selected either by rear panel switch or external programming, a logic signal $\overline{EXT\ REF}$ is available at the BCD output socket, pin 25.

For valid ratio measurements a X5 voltage gain is required between the external voltage reference and the voltage presented to the converter integrator (to match the X5 gain in the signal path provided by M34 on the A – D P.C.B.

The 1V external reference amplifier, RO2, the essential features of which are shown in Fig. 1:17, provides X5 gain and presents a high impedance to the external voltage.

Amplifier M1 and M2 are used in the non-inverting configuration to produce a high input impedance.

Amplifier M3 produces a differential input to single ended output conversion and gives an overall gain of X5.

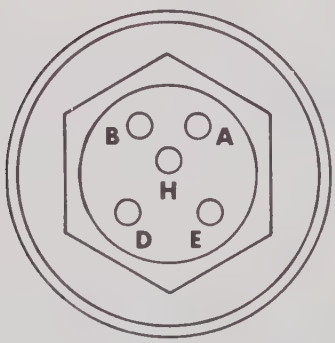
The switching of internal to external reference is achieved using relay K1.

Pin Connections as seen from rear.

E = Input Hi

D = Input Lo

H = Analogue Common



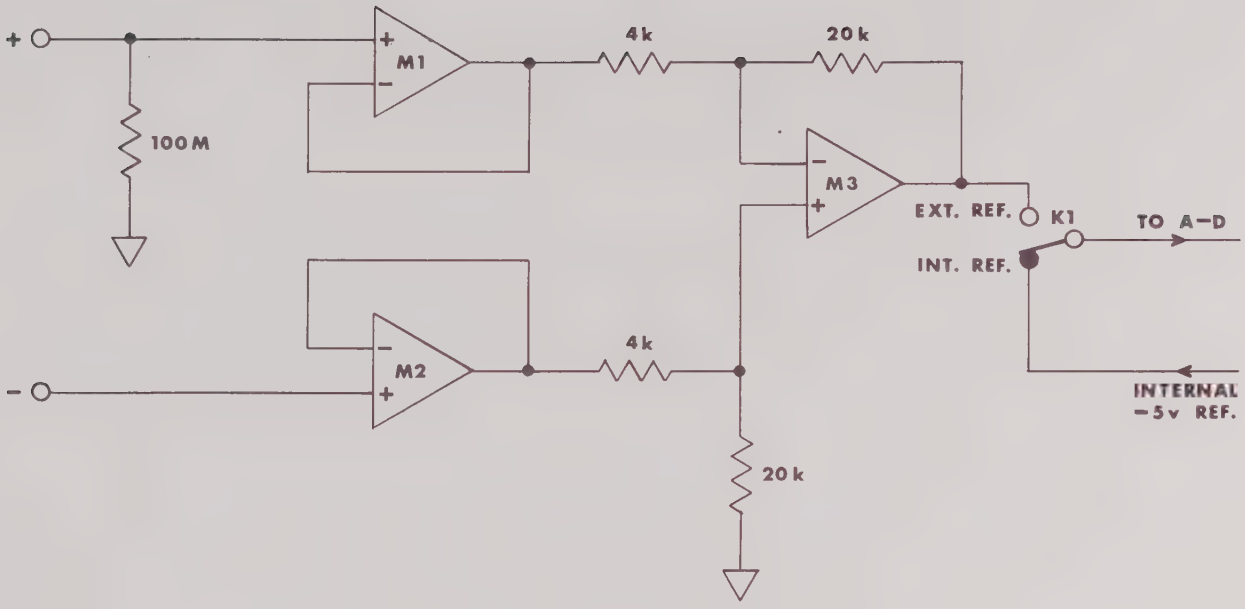
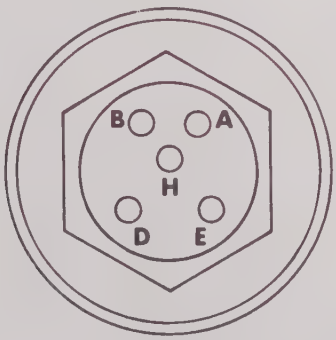


FIG 1:17 EXTERNAL REFERENCE AMPLIFIER

An alternative ratio option, RO5, is available for a 3V to 20V and 30V to 200V external reference. In this case the overall gain to that external reference is x·5 and x·05 respectively, as opposed to x5 for the 0.3V to 2.0V version. Otherwise operation is as for the low voltage reference version.

Pin connections seen from rear.

10V/100V
external reference range



A — Input Hi 10V
B — Input Lo 10V
D — Input Lo 100V
E — Input Hi 100V
H — Signal input Lo

SECTION 2

MAINTENANCE

2.1 INTRODUCTION

2.1.1 General

Regular maintenance of the instrument will enable the user to have confidence in measurements made as well as ensuring the highest accuracy possible.

Normally this will consist of checking the calibration at, or before, the end of the guaranteed specification validity period and adjusting where necessary.

Section 4.2 of the Operating Manual gives a routine for checking the instrument is working within its specified accuracy and may be used as the first stage of an instrument check.

Any readings found to be grossly out of specification should be treated with suspicion as they may indicate a fault.

A routine calibration procedure is given in Section 2.2 of this manual.

Before attempting any calibration it must be ensured that the test equipment is of sufficiently high accuracy. The test equipment required is specified in Section 2.2.2. It is also recommended that Section 1, Technical Description, be read before commencing, in order that some idea may be gained of the purpose and possible interaction of the various adjustments.

The circuit diagrams and printed circuit board layouts are contained in Section 4 of this manual.

In case of difficulties or for general advice in servicing your instrument, do not hesitate to contact our Customer Service Department. (For the address and telephone number, see the front of this manual).

2.1.2 Removal of Covers – Access for Calibration or Repair

Access to the interior of the instrument for routine calibration, or repair, is achieved by removing the four screws securing the top cover, two screws at each side, and lifting the cover clear of the instrument. Removal of the bottom cover is achieved in an identical manner. The top cover provides access to the Analogue to Digital Converter, the DC Isolator and the External Reference option. The bottom cover provides access to the AC and Resistance Options and BCD Output option. With both covers removed the instrument is still operational, may be inverted without component damage and full mechanical rigidity is maintained during servicing operations.

NOTE: The front panel terminals are insulated from the instrument case, enabling the internal circuitry to float at potentials greater than earth, so the potention of the internal Guard Shields can also reach dangerous levels. In addition, mains supplies appear on exposed conductors in the instrument. Therefore great care should be taken when handling an instrument with covers removed if the input terminals are connected to an external source or the mains supply is connected.

Access to the Display Board is achieved by removing the front panel. Disconnect the mains supply to the instrument and any connections to the input terminals. Remove the top and bottom covers as described in previous paragraph. Disconnect all internal leads from the input terminals. Remove the four screws fastening the front panel to the side panels, two screws each side, and the nuts from the studs on the front panel which pass through the centre screen. Draw the front panel forward until it clears the switches and remove the front panel to gain access to the Display Board (it should not be necessary to disconnect the 'power' switch).

2.2 ROUTINE CALIBRATION

2.2.1 General

The following section contains a calibration procedure which should be carried out at the end of the Specification Validity period, as stated in Section 4.1.1 of the Operating Manual, or when the instrument is found to be out of specification.

Routine calibration should be completed at an ambient temperature of $23^{o}C \pm 1^{o}C$ if the instrument is to meet its specification over the given operating range. Before commencing calibration allow 2 hours 'warm up' at this temperature with the upper and lower covers fitted in position but not fastened in place. The guard screens covering the boards should be left undisturbed throughout calibration.

For the greatest accuracy and for the minimum time spent calibration, it is necessary for the boards to remain at their correct working temperature throughout a recalibration. Allow at least two hours warm up before commencing calibration. The top and bottom covers should be left in position whenever possible except when the actual adjustments are being made. AC, Voltage and Ohms options are initially calibrated with the instrument turned over. After the calibration procedures have been followed through, the instrument should be left the correct way up with the covers on for at least an hour for the internal temperature to stabilise again. If the calibration procedure is now repeated, it will be possible with relatively few adjustments to bring the instrument to optimum calibration.

Calibration of functions should always be in the sequence given.

2.2.2 Test Equipment Required

Test equipment specifications for fault finding, calibration and performance verification are given below. Generally, calibration sources should only be used where the accuracy specification exceeds that of the instrument by a factor of at least 4.

2.2.2.1 DC Calibrator

DC Calibration Source: Accuracy ·003% or better,

e.g., Julie Research DVS 106.

Precision 100:1 attenuator, ratio accuracy better than 10 ppm, nominal impedance 10 kΩ – 100 kΩ. (This is needed where the calibration source does have the required accuracy at 100mV and 10mV).

2.2.2.2 DC Voltmeter

High sensitivity, fully floating DVM or null detector capable of resolving 10μV.

NOTE: (This is only required when Analogue Output option AO1 is fitted).

Otherwise a meter capable of measuring 1 Volt ± ½ Volt.

2.2.2.3 AC Calibrator

Precision AC source capable of 0.02% accuracy at L.F. and 0.05% at 100 kHz. Ranges 10mV to 1000V.

NOTE: This is only required if option 01 or 11 is fitted.

2.2.2.4 Crest Factor Signal

A calibrated assymetric crest factor signal of magnitude approximately one volt to an accuracy of 0.02%.

NOTE: This is only required if option 01 or 11 is fitted. If it is not available the relevant steps in the calibration procedure may be omitted, the effect being a possible loss in accuracy for high crest factor signals.

2.2.2.5 Precision Resistors

A set of resistance standards 100Ω to 10MΩ in decades, the 100Ω and 1 kΩ to be 4 terminal resistors. Calibrated accuracy better than .005% up to 1 MΩ, .01% at 100MΩ.

NOTE: These are only required if option 02 is fitted.

2.2.3 Procedure

2.2.3.1 General

Read Section 2.2.1 before proceeding.

Abbreviations:	TP	–	Test Point.
	w.r.t.	–	with respect to.

2.2.3.2 DC Voltage Calibration

A – D Converter Board Assembly – Drawing No. 409120A.
DC Isolator Board Assembly – Drawing No. 400035.

If the instrument is fitted with an analogue output (option A01), it is necessary to calibrate the DC isolator for correct analogue output and then calibrate the A – D converter for correct displayed readings. If an analogue output is not fitted and the instrument is undergoing routine recalibration, steps 4, 5 may be omitted, these adjustments being made on the digital board instead (steps 6, 9).

DC Voltage calibration involves adjustments on both boards referred to above. The following procedure is divided into sub-sections, the titles of which indicate to which board the component designators contained within that section refer.

For all the following adjustments, DC Mode and Filter should be selected.

1. Integration period calibration. Depress the HOLD button the front of the machine and sense the TTL pulse waveform on TP1 near M20 (digital board). Potentiometer R37 controls the period which should be set to give a period of 20.00 ± .01 m secs i.e. 50 Hz at the test point. In the U.S.A. and other countries where the supply-mains frequency is other than 50 Hz, the waveform period is set to the nominal mains period. Thus, in the U.S.A. set to 16.67 ± 0.01 m secs, i.e. 60 Hz.

Preliminary DC Isolator Board adjustments.

2. Select 10mV range and connect a 10 megohm resistor between Hi and Lo. Note the reading is noisy and takes some time to settle. Adjust R65 for less than 200μV displayed (= 20 pA input current).

3. Leave on 10mV range, and short input. Adjust R75 (Front Panel mV offset adjust) for zero displayed.

4. Switch to 10V range and connect null detector or DVM between analogue output Hi (or TP3) and input Hi. Adjust R73 for null or zero (±30μV).

5. With the null detector or DVM connected as before (step 4), switch to 1V range and apply +1 Volt. Adjust R69 for null or zero ± 30μV. Check with –1 Volt applied. The null detector may now be removed as the analogue output is calibrated.

Digital Board scale adjustments.

6. With instrument on 10V range and input shorted, adjust R75 for zero (bouncing polarity) on display.

7. Select 10V range and apply + 1.7mV. Adjust R106 for 1 bouncing to 2 digits displayed. Check displayed reading for inputs of ± 1mV and ± 10mV. These should be accurate to the least siginificant digit.

8. With +1 Volt applied on the 1 Volt range adjust R86 for +1.0000 displayed. Apply –1 Volt and adjust R95 for –1.0000.

DC Isolator Board full range adjustments.

9. Select 10V range. Apply +10 Volts and adjust R70 for +10.000. Check –10 Volts reads correctly.

10. Check ± 19.000 Volts reads correctly (± 3 digits).

11. Select 100V range. Apply 100.00 Volts. Adjust R71 for correct display. Check for –100.00 Volts.

12. Select 1000V range. Apply 1000.0 Volts. Adjust R72. Check –1000.0 Volts. (Note: Take Care that > 500V pk is not applied between signal Lo and earth).

13. Select 100mV range. Apply + 100.00 mV. Adjust R67. Check for –100.00 mV.

14. Select 10mV range. Apply plus and minus 10.000mV and adjust R68 for a total span of 20.000mV e.g. +9.999 and –10.001mV. Repeat until span is correct. This procedure is necessary due to thermal E.M.F's, which can be nulled out with the front panel mV offset control if desired.

2.2.3.3 AC Voltage Calibration (Options 01 and 11)

AC Converter Board Assembly – Drawing No. 400037.

In general, it will be necessary to proceed through all the steps below. However, if the instrument is within specification for applied inputs of zero, 1mV, 10mV, 10mV on the 10V range, steps 1 – 8 may be omitted.

On the AC Converter options in particular various controls interact and the adjustments must be carried out in sequence.

IMPORTANT
An AC calibration is normally done after the basic DC instrument has been calibrated. If it is intended to calibrate the AC option without first fully calibrating the DC, steps 1 – 9 in the DC Calibration procedure at least must be followed.

Before proceeding, ensure the introductory notes on the calibration procedures have been read.

For all the following adjustments AC Volts and Filter should be selected.

1. Select 10V range and short input. Turn R98 and R115 fully clockwise and R109 fully anticlockwise.

2. Gradually turn R109 clockwise until 3 bouncing to 4 is displayed. Do not pass through zero.

3. Turn R115 anti-clockwise until display starts to oscillate, and then rotate slowly clockwise until oscillations just stop. On some instruments a 'catching diode' has been fitted to inhibit the oscillation. If there is no oscillation sense TP9 with an oscilloscope and adjust R115 until TP9 is zero ± 200mV. (TP9 is located immediately below R70).

4. Turn R109 slowly clockwise until display just shows .000.

5. Apply 10mV 500Hz, and adjust R98 until 10 bouncing to 9 digits is displayed.

6. Adjust R36 for minimum reading (if zero, re-adjust R98 and repeat adjustment of R36).

7. Re-adjust R98 for 10 bouncing to 9 digits displayed.

8. If the input is now shorted again the reading should still be zero or 1 digit for an 01 option or up to 2 digits for 11 option. (If not, steps 1 – 7 should be repeated).

Full Range Adjustments.

Each range on the converter is adjustable in gain by a variable resistor and a parallel trimming capacitor. The ranges are calibrated for a full range input signal at the two nominal frequencies 500Hz and 50kHz. By noting the readings at other frequencies, i.e. 50Hz, 5kHz, 10kHz, and 100kHz, and by checking the accuracy specifications for the instrument at these frequencies an improved frequency response may be obtained for further minor adjustments.

Note there is a single gain control, R67, for the converter which adjusts full range on all ranges equally. This can be used whenever all ranges are found to be either high or low. Otherwise ranges should be adjusted individually and in sequence as detailed below. R67 should be approximately in the centre of its travel before proceeding.

Adjustments below should be made until the reading is within 10 digits of nominal.

9. Switch to 1 Volt range and apply 1 Volt at 500Hz. Adjust R16 for correct reading.

   NOTE: If a high crest factor signal is not available, Steps 10 and 11 may be omitted, the effect being a possible loss of accuracy for high crest factor signals.

10. Apply crest factor signal as previously described.
    Note output when pulses are –ve going at input. Reverse the input and adjust R61 for a similar reading with +ve going pulses.

11. Calibrate the high crest factor signal using R70. Re-check step 9 and repeat calibration of R70 until both are correct.

12. Apply 10V 500Hz, 10V range. Calibrate using R18.

13. Apply 10V 50kHz. Calibrate using C15.

14. Reduce frequency to 5kHz and check that the reading is within ± 2 digits of nominal. If not it will be necessary to move the wire joining R4 and R5, making it more 'earthy' will bring down the reading at 5kHz. Repeat step 13 and re-check. This should only be necessary after component replacement.

15. Apply 1V 50kHz, 1V range. Calibrate using C13.

16. Reduce the frequency to 5kHz and adjust twisted pair capacitor C55 to bring output to within 2 digits of nominal (closer coupling will increase the reading). This can be adjusted without removing the guard shield by varying the capacitance of the coupled wire capacitor, accessible with a screwdriver through the guard shield holes. Repeat step 15 and re-check. This should only be necessary after component replacement.

17. Apply 100V 500Hz, 100V range. Adjust R9 for correct reading.

18. Apply 100V 50kHz. Adjust C6 for correct reading.

The following steps apply to 01 options only:–

19. Apply 10mV 500Hz, 10mV range. Adjust R22 for correcting reading (± 2 digits).

20. Apply 10mV 20kHz. Adjust C18 for correct reading (± 5 digits). Reduce the frequency to 5kHz and note the reading. Slight adjustments to R22 and C18 can now be made to optimize the calibration on this range.

21. Apply 100mV 500Hz, 100mV range. Adjust R26 for correct reading.

22. Apply 100mV 50kHz. Adjust C20 for correct reading.

23. At this point the 1000V range can be checked for full range signals. There are no adjustments but both the 10V and 100V adjustments have some effect.

    N.B. Take care that > 500V pk is not applied between Lo, guard and earth. Also ensure that the maximum gain bandwidth product is not exceeded, e.g. 20kHz at 1000 Volts.

    The AC Converter is now calibrated.

2.2.3.4 Ohms Converter Calibration (Option 02)

Converter Board Assembly – Drawing No. 400036.

IMPORTANT
An ohms board calibration is normally done after the basic DC instrument has been calibrated. If it is intended to calibrate the ohms option without first fully calibrating the DC, steps 1 – 9 in the DC calibration procedure at least must be followed.

Before proceeding ensure the introductory notes on the calibration procedures have been read.

Throughout the following adjustments OHMS and FILTER should be selected unless otherwise stated.

The lower ohmic value resistance standards (100Ω, 1kΩ) should be connected in the normal manner for 4 wire measurements whereas the higher values may be connected for 2 wire measurement. Ensure the 2 wire – 4 wire switch on the instrument is in the relevant position.

Before proceeding re-check step 3 in the DC voltage calibration procedure.

1. Select 4 wire on the 2 wire – 4 wire switch and apply a 4 wire short to the input terminals. This may most simply be done by connecting together I+, Hi and Lo.
   Select 10Ω range. Adjust R55 on the ohms board for .000 displayed.

2. Select 100Ω range and connect 100Ω resistance standard. Adjust R50 for 100.00 displayed.

3. Leave the 100Ω resistance standard connected and insert a 100Ω resistor (± 5%) in series with the I-lead. Adjust R49 for 100.00 displayed.

   Repeat steps 2 and 3 until the displayed reading is correct in both cases.

4. Select 1kΩ range and connect the 1kΩ standard. Adjust R52 for 1.0000 displayed.

5. Select 10kΩ range and connect the 10kΩ standard. Adjust R53 for 10,000 displayed.

6. Select 100kΩ range and connect the 100kΩ standard. Adjust R54 for 100.00 displayed.

7. Select 1MΩ range and connect the 1MΩ standard. Adjust R51 for 1000.0 ± 1 digit displayed.

8. Select 10MΩ range and connect the 10MΩ standard. Note the reading will appear noisy and may take time to settle. Adjust R59 for 10.000 ± 4 digits displayed.

9. Repeat steps 7 and 8 until both are correctly adjusted.

The Ohms converter is now calibrated.

2.2.3.5 External Reference (Ratio) Calibration (Option R02).

External Reference (Ratio) Board – Drawing No. 400076.
A – D Converter Assembly Board – Drawing No. 409120A.

Polarity Quadrant definitions:–

Quadrant 1 – positive signal, positive ext. ref.
Quadrant 3 – Negative signal positive ext. ref.

1. Select External Reference on the rear panel slide switch. Select 1, DC V. Connect the DC cali brator to the voltage input terminals of the front panel of the instrument and the external reference 'Signal Input' to obtain a voltage ratio as defined by Quadrant 1 when a positive signal is applied. Set all potentiometers to mid-point.

2. Apply +1.2V and adjust R14 (on External Reference board) to produce a reading of 1.0000 on the display.

3. Set voltage source to +0.2V, adjust R24 (on External Reference board) to produce a reading of 1.0000 on the display.

4. Repeat steps 2 and 3 until the readings are correct without any further adjustment.

5. Select Quadrant 3 by either reversing signal inputs and applying positive voltages or reversing external reference inputs and applying negative voltages.

6. Apply 0.2V and adjust R98 (on the A – D Converter board) to produce a reading of 1.0000 on the display.

7. Select Internal Reference. Apply 1V and adjust R95 (on A– D Converter board) to produce a reading of 1.0000 on the display.

8. Select External Reference. Apply 1.2V and adjust R19 (on External Reference board) for a reading of 1.0000 on the display.

9. Repeat steps 6 to 8 until the readings are correct without any further adjustment.

10. Select Quadrant 1 by reversing chosen operation from Step 5.

11. Repeat steps 2 to 10 checking readings are correct.

This completes the calibration of external reference option R02.

2.2.3.6 R05 External Reference Calibration.

1. Select External Reference on the rear panel slide switch. Select 10, DC V. Connect the DC calibrator to the voltage input terminals of the front panel of the instrument and the external reference 'Signal Input' to obtain a voltage ratio as defined by Quadrant 1 when a positive signal is applied. Set all potentiometers to mid-point.

2. Apply +12V and adjust R6 (on External Reference board) to produce a reading of +10.000 on the display.

3. Set voltage source to +2V, adjust R15 (on External Reference board) to produce a reading of +10.000 on the display.

4. Repeat steps 2 and 3 until the readings are correct without any further adjustment.

5. Select Quadrant 3 by either reversing signal inputs and applying positive voltages or reversing external reference inputs and applying negative voltages.

6. Apply .2V and adjust R98 (on the A – D Converter board) to produce a reading of –10.000 on the display.

7. Select Internal Reference and 1V range. Apply –1V and adjust R95 (on A – D Converter board) to produce a reading of –1.0000 on the display.

8. Select External Reference and 10V range. Apply +12V and adjust R5 (on External Reference board) for a reading of –10.000 on the display.

9. Repeat steps 6 to 8 until the readings are correct without any further adjustment.

10. Select Quadrant 1 by reversing chosen operation from Step 5.

11. Repeat steps 2 to 10 checking readings are correct.

12. Select Quadrant 1 using the 100V range ratio input. Select 100V range on front panel. Apply +120V and adjust R2 (on External Reference board) for a reading of +100.00 on display.

13. Select Quadrant 3 as described in Step 5. Apply 120V and adjust R1 for –100.00 on display.

14. Repeat steps 12 and 13 until no further adjustments are necessary.

15. Apply 20V input in Quadrants 1 and 3. Check readings are –100.00 ± 1 digit.

16. Repeat steps 2 to 16 checking readings are correct.

This completes the calibration procedures.

2.3 REPAIR AND COMPONENT REPLACEMENT

IT IS RECOMMENDED THAT THIS SECTION BE NOTED BEFORE UNDERTAKING ANY REPAIR.

A fault in the analogue circuitry will require the internal Guard Shields removing for access to the components and subsequent recalibration. Digital integrated circuits are fitted in sockets and can be replaced without disturbing the calibration of the instrument (although it is advisable to verify the performance after any component change).

The method of manufacture evolved by DATRON to ensure high reliability and stability involves elevated temperature 'burn-in' at both component and instrument level. In addition, operational amplifiers and other devices are selected for certain parameters. Hence many of the components used, although originally of a standard type, have a performance which can only be identified by a DATRON part number. These devices are held as stock items by DATRON who should be contacted if replacement is necessary.

Replacement of certain active devices and precision resistors also necessitates the re-selection of their associated F.S.V. (Factory Selected Value) resistors to accommodate component tolerances. These resistors, often high stability, metal film types are used to preset an offset or reference setting, usually with fine adjustment provided by an associated potentiometer. For information concerning the re-selection of F.S.V. resistors, the relevant sheets are available from DATRON.

Replacement of analogue components should be followed by recalibration of the relevant part of the circuit and details of these procedures are available from DATRON. Full routine calibration should then be carried out to ensure the instrument is within specification – if in any doubt consult our Customer Service Department.

When replacing semiconductor devices take great care to avoid overheating them during soldering...each joint being made as rapidly as possible. Although the use of a thermal shunt between semiconductor device and the soldered joint is strongly recommended, it is realised that it is impractical to use one in many instances.....particularly when unsoldering a multi-lead device from a high density circuit board, a suction de-soldering tool is recommended.

When working on the isolator board, special consideration should be given to the effects of board leakage. Although active guarding is used extensively to reduce these effects, it should be borne in mind because of the high input impedance and sensitivity involved.

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R1	003223	22K 5% 2W CARBON			4
R2	003223	22K " "			—
R3	003223	22K " "			—
R4	003223	22K " "			—
R5	000823	82K 5% ¼W CARBON	MULLARD	CR25	2
R6	000103	10K " "	"	"	49
R7	000105	1M " "	"	"	4
R8	000103	10K " "	"	"	—
R9	011001	1K 1% ⅛W MF	HOLCO	H8	1
R10	440024	F.S.V. 1-10M 1% MF	"	"	2 of KIT
R11	440024	F.S.V. "	"	"	—
R12		NOT USED			
R13	011622	16K2 1% ⅛W MF	HOLCO	H8	1
R14		NOT USED			
R15		"			
R16		"			
R17		"			
R18	000106	10M 10% ¼W CARBON	MULLARD	CR25	7
R19	000106	10M " "	"	"	—
R20	000562	5K6 5% ¼W CARBON	"	"	2
R21	070067	20K 0.1% WW	MANN	MX125B	2
R22	070071	2K4 " "	"	"	1
R23	016818	68R1 1% ⅛W MF	HOLCO	H8	1

NOTES

SEE SHEET 2 FOR LATEST ISSUE

ISS	30 C
ECO	757,758
DATE	786, 788
CHKD	MD

DATE 24-10-78
DRAWN MPA.
CHECKED MD
APPROVED
DATE

datron ELECTRONICS LTD

TITLE 1041 D.C ISOLATOR

DRAWING NUMBER 4.00035

SHEET 2 OF 25

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R24	070068	2K2 0·1% WW	MANN	MX125B	1
R25	070067	20K " "	"	"	—
R26	000823	82K 5% ¼w CARBON	MULLARD	CR25	—
R27	000912	9K1 " "	"	"	1
R28	000202	2K " "	"	"	3
R29	000106	10M 10% ¼w CARBON	MULLARD	CR25	—
R30	000106	10M " "	"	"	—
R31	000105	1M 5% ¼w CARBON	"	"	—
R32	000106	10M 10% ¼w CARBON	"	"	—
R33	070086	20K 0·1% WW	MANN	M3C-B	1
R34	070085	2K2 " "	"	"	1
R35	000202	2K 5% ¼W CARBON	MULLARD	CR25	—
R36	000106	10M 10% ¼w CARBON	MULLARD	CR25	—
R37	000103	10K 5% ¼w CARBON	"	"	—
R38	000202	2K " "	"	"	—
R39	000106	10M 10% ¼w CARBON	"	"	—
R40	000473	47K 5% ¼w CARBON	"	"	43
R41	000223	22K " "	"	"	3
R42	011002	10K 1% ⅛w MF	HOLCO	HB	2
R43	011302	13K " "	"	"	2
R44	011302	13K " "	"	"	—
R45	011002	10K " "	"	"	—
R46	000103	10K 5% ¼w CARBON	MULLARD	CR25	—

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

—													
ECO													
DATE													
CHKD													

DATE 24/10/78
DRAWN MPA
CHECKED MD
APPROVED
DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 3 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R47	000109	10K 5% ¼w CARBON	MULLARD	CR25	—
R48	000683	68K " "	"	"	7
R49	000683	68K " "	"	"	—
R50	000273	27K " "	"	"	2
R51	000273	27K " "	"	"	—
R52	008007	10R 5% ⅛w CARBON	"	CR16	2
R53	008007	10R " "	"	"	—
R54	000104	100K 5% ¼w CARBON	"	CR25	34
R55	000104	100K " "	"	"	—
R56	000102	1K " "	"	"	5
R57 A – D	090004	2M475 x4 W/W 0·1% R	MANN		1 SET
R60	090004	99K 95 " 0·1% R	"	"	—
R61	000476	47M 10% ¼w CARBON	ALLEN-BRADLEY	CB	2
R62	000105	1M 5% ¼w CARBON	MULLARD	CR25	—
R63	000105	1M " "	"	"	—
R64	000363	36K " "	"	"	1
R65	063502	5K POT CERMET	BECKMAN	72P	1
R66		NOT USED			
R67	063100	10R POT CERMET	BECKMAN	72P	3
R68	063100	10R " "	"	"	—
R69	063500	50R " "	"	"	1
R70	063100	10R " "	"	"	—
R71	063501	500R " "	"	"	2

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
E.C.O													
DATE													
CHKD													

DATE 24|10|78

DRAWN MPA

CHECKED MP

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 4 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R72	063501	500R POT CERMET	BECKMAN	72P	—
R73	063104	100K " "	"	"	3
R74	063104	100K " "	"	"	—
R75	064105	1M POT 10 TURN CERMET	"	89P	1
R76	000102	1K 5% ¼w CARBON	MULLARD	CR25	—
R77	000102	1K " "	"	"	—
R78	000123	12K " "	"	"	2
R79	000123	12K " "	"	"	—
R80	000562	5K6 " "	"	"	—
R81	000107	100M 10% ¼w CARBON	ALLEN-BRADLEY	CB	2
R82	000107	100M " "	"	"	—
R83		NOT USED			
R84		NOT USED			
R85	000476	47M 10% ¼W CARBON	ALLEN BRADLEY	CB	—
R86	000103	10K 5% ¼w CARBON	MULLARD	CR25	—
R87		NOT USED			
R88	000270	27R 5% ¼w CARBON	"	"	2
R89	000270	27R " "	"	"	—
R90	000222	2K2 " "	"	"	1
R91 — R100		NOT USED			
R58 & R59		NOT USED			

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

DATE	24/10/78	datron ELECTRONICS LTD	
DRAWN	MPA	TITLE	1041 D.C. ISOLATOR
CHECKED	MD		
APPROVED		DRAWING NUMBER	400035
DATE		SHEET	5 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R101	000473	47K 5% 1/4W CARBON	MULLARD	CR25	—
R102	000473	47K " "	"	"	—
R103	000473	47K " "	"	"	—
R104	000473	47K " "	"	"	—
R105	000473	47K " "	"	"	—
R106	000473	47K " "	"	"	—
R107	000473	47K " "	"	"	—
R108	000473	47K " "	"	"	—
R109	000152	1K5 " "	"	"	6
R110	000152	1K5 " "	"	"	—
R111	000152	1K5 " "	"	"	—
R112	000473	47K " "	"	"	—
R113	000103	10K " "	"	"	—
R114	000473	47K " "	"	"	—
R115	000103	10K " "	"	"	—
R116	000473	47K " "	"	"	—
R117	000103	10K " "	"	"	—
R118	000473	47K " "	"	"	—
R119	000473	47K " "	"	"	—
R120	000473	47K " "	"	"	—
R121	000103	10K " "	"	"	—
R122	000103	10K " "	"	"	—
R123	000473	47K " "	"	"	—

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

NO.													
E.C.O													
DATE													
CHKD.													

DATE 24·10·78

DRAWN MPA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 DC. ISOLATOR

DRAWING NUMBER 400035

SHEET 6 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R124	000103	10K 5% 1/4W CARBON	MULLARD	CR25	–
R125	000473	47K " "	"	"	–
R126	000152	1K5 " "	"	"	–
R127	000152	1K5 " "	"	"	–
R128	000152	1K5 " "	"	"	–
R129	000103	10K " "	"	"	–
R130	000473	47K " "	"	"	–
R131	000473	47K " "	"	"	–
R132	000103	10K " "	"	"	–
R133	000473	47K " "	"	"	–
R134	000103	10K " "	"	"	–
R135	000473	47K " "	"	"	–
R136	000473	47K " "	"	"	–
R137	000103	10K " "	"	"	–
R138	000473	47K " "	"	"	–
R139	000473	47K " "	"	"	–
R140	000103	10K " "	"	"	–
R141	000473	47K " "	"	"	–
R142	000103	10K " "	"	"	–
R143	000473	47K " "	"	"	–
R144	000473	47K " "	"	"	–
R145	000473	47K " "	"	"	–
R146	000473	47K " "	"	"	–

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS														
ECO														
DATE														
CHKD														

DATE 24·10·78

DRAWN MPA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 7 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R147	000103	10K 5% 1/4W CARBON	MULLARD	CR25	—
R148	000103	10K " "	"	"	—
R149	000473	47K " "	"	"	—
R150	000473	47K " "	"	"	—
R151	000473	47K " "	"	"	—
R152	000473	47K " "	"	"	—
R153	000473	47K " "	"	"	—
R154 * R155	000473	47K " "	"	"	—
R156	000473	47K " "	"	"	—
R157	000473	47K " "	"	"	—
R158	000103	10K " "	"	"	—
R159	000473	47K " "	"	"	—
R160	000473	47K " "	"	"	—
R161	000103	10K " "	"	"	—
R162	000103	10K " "	"	"	—
R163	000103	10K " "	"	"	—
R164	000103	10K " "	"	"	—
R165	000103	10K " "	"	"	—
R166	000103	10K " "	"	"	—
R167	000103	10K " "	"	"	—
R168	000103	10K " "	"	"	—
R169	000103	10K " "	"	"	—
R170	000103	10K " "	"	"	—

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
E.C.O													
DATE													
CHKD													

DATE 24/10/78

DRAWN MPA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 8 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R171	000103	10K 5% 1/4W CARBON	MULLARD	CR25	—
R172	000104	100K " "	"	"	—
R173	000104	100K " "	"	"	—
R174	000104	100K " "	"	"	—
R175	000104	100K " "	"	"	—
R176	000104	100K " "	"	"	—
R177	000104	100K " "	"	"	—
R178	000103	10K " "	"	"	—
R179	000103	10K " "	"	"	—
R180	000104	100K " "	"	"	—
R181	000104	100K " "	"	"	—
R182	000104	100K " "	"	"	—
R183	000104	100K " "	"	"	—
R184	000104	100K " "	"	"	—
R185	000103	10K " "	"	"	—
R186	000683	68K " "	"	"	—
R187	000683	68K " "	"	"	—
R188	000683	68K " "	"	"	—
R189	000683	68K " "	"	"	—
R190	000104	100K " "	"	"	—
R191	000104	100K " "	"	"	—
R192	000104	100K " "	"	"	—
R193	000103	10K " "	"	"	—

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
E.C.O													
DATE													
CHKD.													

DATE 24·10·78

DRAWN MRA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 9 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R 194	000104	100K 5% 1/4W CARBON	MULLARD	CR25	–
R 195	000104	100K " "	"	"	–
R 196	000104	100K " "	"	"	–
R197	000103	10K " "	"	"	–
R198	000103	10K " "	"	"	–
R199	000103	10K " "	"	"	–
R200	000683	68K " "	"	"	–
R201	000103	10K " "	"	"	–
R202	000104	100K " "	"	"	–
R203	000103	10K " "	"	"	–
R204	000104	100K " "	"	"	–
R205	000103	10K " "	"	"	–
R206	000473	47K " "	"	"	–
R207	000103	10K " "	"	"	–
R208	000104	100K " "	"	"	–
R209	000103	10K " "	"	"	–
R210	000473	47K " "	"	"	–
R211	000104	100K " "	"	"	–
R212	000104	100K " "	"	"	–
R213	000224	220K " "	"	"	1
R214	000103	10K " "	"	"	–
R215	000104	100K " "	"	"	–
R216	000104	100K " "	"	"	–

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

■													
E.C.O.													
DATE													
CHKD													

DATE 24·10·78

DRAWN MPA

CHECKED

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 10 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R217	000104	100K 5% 1/4W CARBON	MULLARD	CR25	–
R218	000104	100K " "	"	"	–
R219	000104	100K " "	"	"	–
R220	000104	100K " "	"	"	–
R221	000104	100K " "	"	"	–
R222	000104	100K " "	"	"	–
R223	000102	1K " "	"	"	–
R224	000102	1K " "	"	"	–
R225	000275	2M7 10% 1/4W CARBON	"	"	2
R226	000275	2M7 10% 1/4W CARBON	"	"	–
R227	000474	470K 5% 1/4W CARBON	"	"	4
R228	000474	470K " "	"	"	–
R229	000474	470K " "	"	"	–
R230	000103	10K " "	"	"	–
R231	000103	10K " "	"	"	–
R232	000475	4M7 10% 1/4W CARBON	ALLEN BRADLEY	CB	2
R233	000223	22K 5% 1/4W CARBON	MULLARD	CR25	–
R234	000473	47K " "	"	"	–
R235	000104	100K " "	"	"	–
R236	000104	100K " "	"	"	–
R237	000103	10K " "	"	"	–
R238	000103	10K " "	"	"	–
R239		NOT USED			

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

No.														
E.C.O.														
DATE														

DATE 24-10-78

DRAWN MPA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 11 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R240	090049	18M 0·2% M/P	HOLCO	H801R	1 PAIR
R241	090049	18M " "	"	"	—
R242	041005	10M 1% 1/2W C/F	ALLEN BRADLEY	CC	1
R243	011003	100K 1% 1/8W M/F	HOLCO	H8	1
R244	013921	3K92 " "	"	"	1
R245	000185	1M8 10% 1/4W CARBON	MULLARD	CR25	1
R246	043924	3M92 1% 1/2W C/F	ALLEN BRADLEY	CC	3
R247	043924	3M92 " "	"	"	—
R248	000474	470K 5% 1/4W CARBON	MULLARD	CR25	—
R249	043924	3M92 1% 1/2W C/F	ALLEN BRADLEY	CC	—
R250	000475	4M7 10% 1/4W CARBON	MULLARD	CR25	—
R251		F.S.V. 1% M/F	HOLCO	H8	1
R252	000336	33M 10% 1/4W CARBON	ALLEN BRADLEY	CB	1
R253	042215	22M1 1% 1/2W C/F	"	CC	2
R254	042215	22M1 " "	"	"	—
R255	063104	100K POT CERMET	BECKMAN	72P	—
R256	063205	2M " "	"	"	1
R257		NOT USED			
R258	000223	22K 5% 1/4W CARBON	MULLARD	CR25	—

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
E.C.O													
DATE													
CHKD.													

DATE 24-10-78	datron ELECTRONICS LTD
DRAWN MAA	TITLE 1041 DC ISOLATOR
CHECKED MD	
APPROVED	
DATE	DRAWING NUMBER 400035 — SHEET 12 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
C1	150001	22µF 16V TANT.	UNION CARBIDE		2
C2	150001	22µF " "	"		-
C3	180006	47µF 25V AL. ELECT	MULLARD	016-16479	2
C4	180006	47µF " "	"	"	-
C5	180021	3µ3F 63V "	"	015-18338	2
C6	180021	3µ3F " "	"	"	-
C7	180022	33µF 40V "	"	016-17339	2
C8	180022	33µF " "	"	"	-
C9	150007	6µ8F 16V TANT	UNION CARBIDE		1
C10	101103	0·01µF CER. DISC	ERIE	801	13
C11	102471	470pF "	"	"	4
C12		NOT USED			
C13		NOT USED			
C14	140003	0·047µF 10% POLYCARB	WIMA	MKP10	1
C15	102471	470pF CER. DISC	ERIE	801	-
C16	120002	2µ2F 160V 10% POLYCARB	ADVANCE	MR30A	1
C17 (SEE NOTE 1 BELOW)	140006	0·33µF 10% POLYPROP	WIMA	MKP10	1
C18 (SEE NOTE 2 BELOW)	140005	0·15µF " "	"	"	2
C19	140004	0·068µF " "	"	"	1
C20	101103	0·01µF CER. DISC	ERIE	801	-
C21	110002	0·15µF 10% POLYESTER	MULLARD	C280AEP150K	1
C22	102471	470pF CER. DISC	ERIE	801	-
C23	102471	470pF "	"	"	-

NOTES. 1/. USE 140014 IN PLACE OF 140006 UNTIL STOCK IS EXHAUSTED.

2/. ALTERNATIVE FOR C18 - 140013 (WIMA MKP10) 0·15µF 10% 250Vd.c.

SEE SHEET 2 FOR LATEST ISSUE

ISS														
ECO														
DATE														
CHKD														

DATE 24-10-78	datron ELECTRONICS LTD
DRAWN MPA	TITLE 1041 D.C. ISOLATOR
CHECKED	
APPROVED	
DATE	DRAWING NUMBER 400035 SHEET 13 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
C24	120004	0·68μF 10% POLYCARB	ADVANCE	MD15A	1
C25	120006	0·47μF 10% POLYCARB	"	MR10A	1
C26	140005 (SEE NOTE 1 BELOW)	0·15μF 10% POLYPROP	WIMA	MKP10	—
C27		NOT USED			
C28		NOT USED			
C29		NOT USED			
C30	101103	0·01μF CER. DISC	ERIE	801	—
C31	101103	0·01μF "	"	"	—
C32	101103	0·01μF "	"	"	—
C33	101103	0·01μF "	"	"	—
C34	180010	33μF 6V3 AL. ELECT	MULLARD	015-13339	2
C35	180010	33μF " "	"	"	—
C36	101103	0·01μF CER DISC	ERIE	801	—
C37	110017	0·022μF 20% POLYESTER	MULLARD	C280 AE P22K	1
C38	101103	0·01μF CER DISC	ERIE	801	—
C39	101103	0·01μF "	"	"	—
C40	101103	0·01μF "	"	"	—
C41	101103	0·01μF "	"	"	—
C42	101103	0·01μF "	"	"	—
C43	101103	0·01μF "	"	"	—
C44	102102	1nF "	"	"	4
C45	102102	1nF "	"	"	—
C46	102102	1nF "	"	"	—

NOTES. 1/. ALTERNATIVE FOR C26 - 140013 - 0·15μF 10% 250V d.c.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
E.C.O													
DATE													
CHKD													

DATE 24-10-78	datron ELECTRONICS LTD
DRAWN MPA	TITLE 1041 D.C. ISOLATOR
CHECKED MD	
APPROVED	
DATE	DRAWING NUMBER 400035 — SHEET 14 OF 25

L.W. 1184

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
C47	102222	2n2 CER. DISC.	ERIE	801	1
C48	102101	100pF "	"	"	2
C49	102101	100pF "	"	"	—
C50	102102	1nF "	"	"	—

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
E.C.O													
DATE													
CHKD													

DATE 24-10-78

DRAWN MPA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 15 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
D1	200001	DIODE Si GP	FAIRCHILD / MULLARD	1N4148	62
D2	200001	" "	"	"	–
D3	200001	" "	"	"	–
D4	200001	" "	"	"	–
D5	200001	" "	"	"	–
D6	200001	" "	"	"	–
D7	200008	DIODE LOW LEAKAGE	FAIRCHILD	1N458A	10
D8	200008	" "	"	"	–
D9	200008	" "	"	"	–
D10	200008	" "	"	"	–
D11	200008	" "	"	"	–
D12		NOT USED			
D13		NOT USED			
D14		NOT USED			
D15		NOT USED			
D16	200001	DIODE Si GP	FAIRCHILD / MULLARD	1N4148	–
D17	200001	" "	"	"	–
D18	200001	" "	"	"	–
D19	200001	" "	"	"	–
D20	200008	DIODE LOW LEAKAGE	FAIRCHILD	1N458A	–
D21	200008	" "	"	"	–
D22	200001	DIODE Si GP	FAIRCHILD / MULLARD	1N4148	–
D23	200001	" "	"	"	–

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS												
ECO												
DATE												
CHKD												

DATE 24-10-78

DRAWN MPA

CHECKED

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C ISOLATOR

DRAWING NUMBER 400035

SHEET 16 OF 25

UW 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
D24	200001	DIODE Si GP	FAIRCHILD / MULLARD	IN4148	–
D25	200001	" "	"	"	–
D26	200008	DIODE LOW LEAKAGE	FAIRCHILD	IN458A	–
D27	200008	" "	"	"	–
D28	200008	" "	"	"	–
D29 – 100		NOT USED			
D101 – 137	200001	DIODE Si GP	FAIRCHILD / MULLARD	IN4148	–
D138		NOT USED			
D139		NOT USED			
D140 – 150	200001	DIODE Si GP	FAIRCHILD / MULLARD	IN4148	–

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS														
ECO														
DATE														
CHKD														

DATE 24-10-78

DRAWN MPA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 17 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
Z1	210056	ZENER DIODE 5V6 400mW	MULLARD	BZY88 - C5V6	4
Z2	210056	" "	"	"	—
Z3	210150	ZENER DIODE 15V 250mW	"	BZY88 - C15	2
Z4	210150	" "	"	"	—
Z5	210056	ZENER DIODE 5V6 400mW	"	BZY88 - C5V6	—
Z6	210056	" "	"	"	—
Z7	210220	ZENER DIODE 22V 400 mW	"	BZY88 - C22	2
Z8	210220	" "	"	"	—

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
E.C.O													
DATE													
CHKD													

DATE 24-10-78

DRAWN MPA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATTOR

DRAWING NUMBER 400035

SHEET 18 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
Q1	240001	TRANSISTOR N.P.N GP		BC184/TO18	33
Q2	240001	"		"	–
Q3	240001	"		"	–
Q4	240001	"		"	–
Q5	240001	"		"	–
Q6	240007	TRANSISTOR N.P.N GP	FAIRCHILD	2N3646	1
Q7	240001	TRANSISTOR N.P.N GP		BC184/TO18	–
Q8	240001	"		"	–
Q9	240001	"		"	–
Q10	240001	"		"	–
Q11	240001	"		"	–
Q12	240001	"		"	–
Q13	240001	"		"	–
Q14	240001	"		"	–
Q15	240001	"		"	–
Q16	240001	"		"	–
Q17	240001	"		"	–
Q18	240001	"		"	–
Q19	240001	"		"	–
Q20	240001	"		"	–
Q21	240001	"		"	–
Q22	240001	"		"	–
Q23	240001	"		"	–

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

NO.													
E.C.O.													
DATE													
CHKD.													

DATE 24-10-78

DRAWN MPA

CHECKED MO

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 19 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
Q24	240001	TRANSISTOR N.P.N. GP		BC184/TO18	–
Q25	240001	"		"	–
Q26	240001	"		"	–
Q27	240001	"		"	–
Q28	250001	TRANSISTOR P.N.P. GP		BC214/TO18	5
Q29	250001	"		"	–
Q30	250001	"		"	–
Q31	240001	TRANSISTOR N.P.N. GP		BC184/TO18	–
Q32	250001	TRANSISTOR P.N.P. GP		BC214/TO18	–
Q33	240001	TRANSISTOR N.P.N. GP		BC184/TO18	–
Q34	240001	"		"	–
Q35	240001	"		"	–
Q36	240001	"		"	–
Q37	240001	"		"	–
Q38	250001	TRANSISTOR P.N.P. GP		BC214/TO18	–
Q39	240001	TRANSISTOR N.P.N. GP		BC184/TO18	–
Q40		NOT USED			
Q41	230003	N-FET SWITCH GP	TELEDYNE/NATIONAL	U1899E/NF510/KA093-18	7
Q42	230003	N-FET SWITCH GP	"	"	–
Q43	230003	N-FET SWITCH GP	"	"	–
Q44	230027	N-CHAN J FET SELECTED	TELEDYNE	U3114E	4
Q45	230027	N-CHAN J FET "	TELEDYNE	U3114E	–
Q46	230027	N-CHAN J FET "	TELEDYNE	U3114E	–

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
ECO													
DATE													
DRWN													

DATE 24-10-78

DRAWN MDA

CHECKED NP

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 104 D.C. ISOLATOR

DRAWING NUMBER 400035

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
Q47	230027	N-CHAN J FET SELECTED	TELEDYNE	U3114E	—
Q48	230003	N-FET SWITCH GP	TELEDYNE / NATIONAL	U1899E/NF510/K4093-18	—
Q49	230002	N-FET SWITCH GP	"	U1994E/NF500/K4416-18	2
Q50	230002	"	"	"	—
Q51		NOT USED			
Q52	240006	TRANSISTOR N.P.N.	FAIRCHILD	2N3904	1
Q53	250004	TRANSISTOR P.N.P.	"	2N3906	1
Q54	240014	TRANSISTOR N.P.N.	"	BC337	1
Q55	250011	TRANSISTOR P.N.P.	"	BC327	1
Q56	230003	N-FET SWITCH GP	TELEDYNE/NATIONAL	U1899E/NF510/K4093-18	—
Q57	230003	"	"	"	—
Q58	230003	N-FET SWITCH GP	"	U1899E/NF510/K4093-18	—
Q59	240017	Si N.P.N. MATCHED PAIR	NATIONAL	LM394	1
Q60	230001	N-CHANNEL CURRENT LIM	SILICONIX	E506	1

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS.													
ECO													
DATE													
CHKD													

DATE 24-10-78

DRAWN MPA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 21 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
M1	280001	QUAD 2 I/P MULTIPLEXER	TEXAS/NATIONAL	74C157N	2
M2	280026	4 BIT UP/DOWN DECADE COUNTER	"	74C193	1
M3	280016	QUAD 2 I/P NAND	"	74C00	2
M4	280016	"	"	"	–
M5	280017	HEX INVERTOR	"	14069	1
M6	280019	BCD TO DECIMAL DECODER	"	74C42	1
M7	280018	TRIPLE 3 I/P NAND	"	74C10	1
M8	280001	QUAD 2 I/P MULTIPLEXER	"	74C157N	–
M9	220015	OPTO - ISOLATOR	SPECTRONICS	SPX33	6
M10	220015	"	"	"	–
M11	220015	"	"	"	–
M12	220015	"	"	"	–
M13	220015	"	"	"	–
M14	220015	"	"	"	–
M16		NOT USED			
M16		NOT USED			
M17		NOT USED			
M18		NOT USED			
M19		NOT USED			
M20		NOT USED			
M21		NOT USED			
M22	260026	LINEAR 212 OP AMP	NATIONAL	LM212H	3
M23	260026	"	"	LM212H	–

NOTES

SEE SHEET 2 FOR LATEST ISSUE

ISS														
ECO														
DATE														
CHKD														

DATE 24-10-78

DRAWN MPA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 22 OF 25

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
M24	260002	LINEAR μA 741 OP AMP	FAIRCHILD	741 HC	2
M25	260002	"	"	"	-
M26	260032	LINEAR FET I/P OP AMP	RCA	CA3140T	1
M27	260022	JFET INPUT OP AMP	NATIONAL	LF 355	1
M28	260026	LINEAR 212 OP AMP	"	LM 212H	-
RLH	330003	RELAY 28V DP. D.T.	POTTER AND BRUMFIELD	R10-E1-L2-S3.2K	1
	400064	INPUT CABLE ASSEMBLY			1
	410003-11	P.C.B.			1
	450009	UPPER GUARD SHIELD			1
	450010	LOWER GUARD SHIELD			1
	459112	RELAY BRACKET			1

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
E.C.O													
DATE													

DATE 24-10-78

DRAWN MPA

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
	510222	7/·2 P.V.C. WIRE RED			A/R
	540001	22 SWG B.T.C. WIRE			A/R
	590001	SLEEVE BLACK	HELLERMAN	H15 x 20mm LG	5
	590004	SLEEVING			A/R
	601002	CONNECTOR SNAP	AMP	60803-1	12
	602001	F.S.V. TERMINAL PIN	MOLEX	02-04-1875	6
J3 - J4	605002	SOCKET DIL. 16 PIN	ANTIPERENCE	ICN-163-S3	2
J1 - J2	605005	CONNECTOR 13 WAY	AMP	1-163680-2	2
	605037	SOCKET D.I.L. 14 PIN	ASTRALUX	ICL 163-S6T	4
	605038	SOCKET D.I.L. 16 PIN	"	ICL 183-S3T	4
	605066	SOCKET D.I.L. 6PIN	"	ICY 063-S3-T	6
	611004	SCREW POZIPAN M3x6		M3x6mm	1
	611006	SCREW POZIPAN M3x10		M3x10mm	6
	611007	SCREW POZI CSK M3x6		M3x6mm	6
	612005	STANDOFF M3x23	HARWIN		6
	613005	SHAKEPROOF WASHER M3			7
	615002	NUT M3 HEX		M3	1
	615005	NUT 3-48 UNC HEX			1
	613011	NYLON WASHER 6BA			14

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS.													
E.C.N.													
DATE													
CHKD													

DATE 24-10-78

DRAWN MPA

CHECKED MP

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 1041 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 24 OF 25

W. 2368

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
	620001	P.T.F.E. CLOVERLEAF	SEALECTRO	FT - E - 12	5
	620002	P.T.F.E. STANDOFF	"	STSM1P51	5
	620003	TERMINAL RIVET	HARWIN	H2106A	10
	630026	MULTI-TURN POT SHROUD	BECKMAN	89B	1
	630036	INSULATING BEAD STEATITE		TYPE NR 1	4
S1 - S7	700011	SWITCH 7 x 2 POLE INTERLOCK	LIPA AND ISOSTAT		1
S8 - 10	700013	SWITCH 3x2 POLE PUSH on/off	"		1
S11 - 13	700012	SWITCH 3x2 POLE INTERLOCK	"		1
	700020	BUTTON CHROME	"		13

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

INK													
ECO													
DATE													
CHKD													

DATE 24-10-78

DRAWN MPA.

CHECKED MD

APPROVED

DATE

datron ELECTRONICS LTD

TITLE 104 D.C. ISOLATOR

DRAWING NUMBER 400035

SHEET 25 OF 25

	PART No.		MANUFACTURER	PART No.	Per Assy.
R2	000 102	1K 5% ¼W Carbon	Mullard	CR25	5
R3 - R6	050 005	275K .25% ⅛W MF	Erg	EE 0.25 - C-C4	4
R7	000 332	3K3 5% ¼W Carbon	Mullard	CR25	3
R8	050 004	995K .25% ¼W MF	Erg	EE 0.25 - C-C4	3
R9	063 103	10K ⅜" Cer Pot	Beckman	72P	3
R10	050 006	10K1 .25% ⅛W MF	Erg	EE 0.125 - C-C4	2
R11	000 330	33R 5% ¼W Carbon	Mullard	CR25	1
R12	000 222	2K2 5% ¼W Carbon	Mullard	CR25	2
R13	000 825	8M2 10% ¼W Carbon	Mullard	CR25	1
R14	000 105	1M 5% ¼W Carbon	Mullard	CR25	6
R15	050 004	995K .25% ¼W MF	Erg	EE 0.25 - C-C4	-
R16	063 103	10K ⅜" Cer Pot	Beckman	72P	-
R17	050 007	110.5K .25% ⅛W MF	Erg	EE 0.125 - C-C4	1
R18	063 102	1K ⅜" Cer Pot	Beckman	72P	2
R19	000 473	47K 5% ¼W Carbon	Mullard	CR25	3
R20	000 332	3K3 5% ¼W Carbon	Mullard	CR25	-
R21	050 004	995K .25% ¼W MF	Erg	EE 0.25 - C-C4	-
R22	063 103	10K ⅜" Cer Pot	Beckman	72P	-
R23	000 473	47K 5% ¼W Carbon	Mullard	CR25	-
R24	000 181	180R 5% ¼W Carbon	Mullard	CR25	1
R25	050 014	99K5 .25% ⅛W MF	Erg	EE 0.125 - C-C4	1
R26	063 102	1K ⅜" Cermet Pot	Beckman	72P	-
R27					

NOTES.

PROD AD. 2.2.77

ISS 15	ISS. 16	ISS 17	ISS. 18	ISS 19 C	ISS. 20	ISS. 21	ISS. 22	ISS 23				
ECO 271	ECO. 357	ECO 392	ECO 415	ECO 423	ECO 542	ECO. 695	669	743				
REV 3	REV 4	REV 5	REV. 6	REV. 7	REV. 8	REV. 9	10	11	12	13	14	
ECO. 25	ECO. 39	ECO. 43	ECO. 54	ECO. 75	ECO. 123	ECO. 143	160	200	205	220	240	

DATE. 15/08/74

DRAWN BY. JKD

CHECK

NEXT DRAWING

Rev X 180

datron ELECTRONICS LTD.

TITLE

1041 AC CONVERTOR
1051

DRAWING NUMBER 400 037

SHEET 2 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	Per Assy.
R28	050 006	10K1 .25% ⅛W MF	Erg	EE .125 - C-C4	-
R29	000 105	1M 5% ¼W Carbon	Mullard	CR25	-
R30	000 104	100K 5% ¼W Carbon	Mullard	CR25	10
R31	000 103	10K 5% ¼W Carbon	Mullard	CR25	8
R32	000 101	100R 5% ¼W Carbon	Mullard	CR25	6
R33	000 820	82R 5% ¼W Carbon	Mullard	CR25	2
R34		FSV (68K - 1M)	Welwyn/Mullard	4033C up to 330K	1 of Pair
R35		FSV (68K - 1M)	Welwyn/Mullard	CR25 over 330K	
R36	063 205	2M ⅜" Cer Pot	Beckman	72P	4
R37	070 088	2K2 1% Wirewound	Mann	MX125B	2
R38	070 088	2K2 1% Wirewound	Mann	MX125B	-
R39	000 820	82R 5% ¼W Carbon	Mullard	CR25	-
R40	000 272	2K7 5% ¼W Carbon	Mullard	CR25	2
R41		FSV (470K - 4M7)	Mullard	CR25	1 of Pair
R42		FSV (470K - 4M7)	Mullard	CR25	
R43	000 102	1K0 5% ¼W Carbon	Mullard	CR25	-
R44	000 683	68K 5% ¼W Carbon	Mullard	CR25	4
R45	000 154	150K 5% ¼W Carbon	Mullard	CR25	2
R46	000 154	150K 5% ¼W Carbon	Mullard	CR25	-
R47	000 682	6K8 5% ¼W Carbon	Mullard	CR25	3
R48	000 101	100R 5% ¼W Carbon	Mullard	CR25	-
R49	000 272	2K7 5% ¼W Carbon	Mullard	CR25	-
R50	000 221	220R 5% ¼W Carbon	Mullard	CR25	1

NOTES.

REV. 3	REV. 4	REV. 5	REV. 6

SEE SHEET 2 FOR LATEST ISSUE

DATE. 15/08/74

DRAWN BY.

CHECK

NEXT DRAWING

Rev 16

datron ELECTRONICS LTD.

TITLE

1041 AC CONVERTOR
1051

DRAWING NUMBER 400 037

SHEET 3 OF 13

	PART No.		MANUFACTURER	PART No.	Per Assy.
R51		FSV (220K - 2M2)	Mullard	CR25	1 of Pair
R52		FSV (220K - 2M2)	Mullard	CR25	
R53	000 102	1K 5% ¼W Carbon	Mullard	CR25	-
R54	000 102	1K 5% ¼W Carbon	Mullard	CR25	-
R55	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R56	000 104	100K 5% ¼W Carbon	Mullard	CR25	-
R57					
R58	050 011	3K3 .25% ⅛W MF	Erg	Ee 0.125 - C-C4	2
R59	050 011	3K3 .25% ⅛W MF	Erg	EE 0.125 - C-C4	-
R60	050 010	8K95 .25% ⅛W MF	Erg	EE 0.125 - C-C4	1
R61	063 101	100R ⅜" Cer Pot	Beckman	72P	1
R62	050 009	18K .25% ⅛W MF	Erg	EE 0.125 - C-C4	1
R63	050 015	100K .25% ⅛W MF	Erg	EE 0.125 - C-C4	2
R64	000 332	3K3 5% ¼W Carbon	Mullard	CR25	-
R65	050 015	100K .25% ⅛W MF	Erg	EE 0.125 - C-C4	-
R66		FSV (150K - 470K)	Welwyn	4033C	1 of Kit
R67	063 500	50R ⅜" Cer Pot	Beckman	72P	2
R68	000 183	18K 5% ¼W Carbon	Mullard	CR25	2
R69	290 026	Part of RMS Kit	Datron		-
R70	063 500	50R ⅜" Cer Pot	Beckman	72P	-
R71	000 270	27R 5% ¼W Carbon	Mullard	CR25	1
R72	000683	FSV (± 68K) FIT 68K ON ASSY	"	"	-
R73	000 108	1R0 5% ¼W Carbon	Mullard	CR25	1

NOTES.

DATE.	datron ELECTRONICS LTD.
15/08/74	
DRAWN BY.	TITLE
CHECK	1041 AC CONVERTOR 1051
NEXT DRAWING	DRAWING NUMBER 400 037
Rev 6 1/3/75	SHEET 4 OF 13

REV. 3	REV. 4	REV. 5	REV. 6
ECO. 25	ECO. 39	ECO. 43	ECO. 54

SEE SHEET 2 FOR LATEST ISSUE

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	Per Assy.
R74	000 912	9K1 5% ¼W Carbon	Mullard	CR25	1
R75	000 152	1K5 5% ¼W Carbon	Mullard	CR25	1
R76	000 473	47K 5% ¼W Carbon	Mullard	CR25	-
R77	000 104	100K 5% ¼W Carbon	Mullard	CR25	-
R78	000 682	6K8 5% ¼W Carbon	Mullard	CR25	-
R79	000 101	100R 5% ¼W Carbon	Mullard	CR25	-
R80	000 821	820R 5% ¼W Carbon	Mullard	CR25	1
R81	000 101	100R 5% ¼W Carbon	Mullard	CR25	-
R82	000 182	1K8 5% ¼W Carbon	Mullard	CR25	2
R83-R84	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R85	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R86	000 183	18K 5% ¼W Carbon	Mullard	CR25	-
R87	000 472	4K7 5% ¼W Carbon	Mullard	CR25	1
R88	000 104	100K 5% ¼W Carbon	Mullard	CR25	-
R89	000 474	470K 5% ¼W Carbon	Mullard	CR25	1
R90	000 682	6K8 5% ¼W Carbon	Mullard	CR25	-
R91	000 101	100R 5% ¼W Carbon	Mullard	CR25	-
R92	000 102	1K 5% ¼W Carbon	Mullard	CR25	-
R93	000 122	1K2 5% ¼W Carbon	Mullard	CR25	1
R94	000 101	100R 5% ¼W Carbon	Mullard	CR25	-
R95	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R96	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R97	000 182	1K8 5% ¼W Carbon	Mullard	CR25	-

NOTES.

REV. 3	REV. 4	REV. 5	REV. 6

SEE SHEET 2 FOR LATEST ISSUE

DATE	15/08/74
DRAWN BY.	
CHECK	
NEXT DRAWING	Rev 6 1343

datron ELECTRONICS LTD.

TITLE: 1041 AC CONVERTOR 1051

DRAWING NUMBER 400 037

SHEET 5 OF 13

	PART No.		MANUFACTURER	PART No.	Per Assy.
R98	063 205	2M ⅜" Cer Pot	Beckman	72P	-
R99	000 476	47M 10% ¼W Carbon	Allan Bradley (Morganite)	CB10	1
R100		FSV (4M7 - 10M)	Mullard	CR25	1 of Pair
R101		FSV (4M7 - 10M)	Mullard	CR25	
R102	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R103	000 104	100K 5% ¼W Carbon	Mullard	CR25	-
R104	000 105	1M 5% ¼W Carbon	Mullard	CR25	-
R105	000 104	100K 5% ¼W Carbon	Mullard	CR25	-
R106	000 104	100K 5% ¼W Carbon	Mullard	CR25	-
R107	000 106	10M 10% ¼W Carbon	Mullard	CR25	6
R108	000 104	100K 5% ¼W Carbon	Mullard	CR25	-
R109	063 205	2M ⅜" Cer Pot	Beckman	72P	-
R110	000 106	10M 10% ¼W Carbon	Allan Bradley (Morganite)	CB10	-
R111	050 012	21K .25% ⅛W M/F	ERG	EE 0.125 -C-C4	1
R112	050016	5K " " "	"	"	1
R113	000 104	100K 5% ¼W Carbon	Mullard	CR25	-
R114	000 222	2K2 5% ¼W Carbon	Mullard	CR25	-
R115	063 205	2M ⅜" Cer Pot	Beckman	72P	-
R116	000 106	10 M 10% ¼W Carbon	Allan Bradley	CB10	-
R117		FSV (1M5 - 10M)	Mullard	CR25	1
R118					
R119	000 104	100K 5% ¼W Carbon	Mullard	CR25	-
R120	000 334	330K 5% ¼W Carbon	Mullard	CR25	1

NOTES.

REV. 3	REV. 4	REV. 5	REV. 6.
ECO. 25	ECO. 39	ECO. 43	ECO. 54

SEE SHEET 2 FOR LATEST ISSUE.

DATE. 15/08/74	datron ELECTRONICS LTD.
DRAWN BY.	TITLE 1041 AC CONVERTOR 1051
CHECK	
NEXT DRAWING	
Rev 23456	DRAWING NUMBER 400 037
	SHEET 6 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R121	000 683	68K 5% ¼W Carbon	Mullard	CR25	-
R122	000 105	1M 5% ¼W Carbon	Mullard	CR25	-
R123	000 105	1M 5% ¼W Carbon	Mullard	CR25	-
R124	000 685	6M8 10% ¼W Carbon	Allan Bradley	CB10	1
R125		FSV (0 - 47K) Carbon	Mullard	CR25	
R126	000 106	10M 10% ¼W Carbon	Allan Bradley	CB10	-
R127	000 683	68K 5% ¼W Carbon	Mullard	CR25	-
R128		FSV (1M - 1M8)	Mullard	CR25	
R129	000226	22 M 10% ¼W Carbon	Allan Bradley	CB10	1
R130		FSV (4R7)			
R131	000106	10M 10% ¼W Carbon	Allan Bradley	CB10	-
R132	000105	1 M 5% ¼W Carbon	Mullard	CR25	-
R133	000106	10M 10% ¼W Carbon	Allan Bradley	CB10	-

NOTES.

REV. 3	REV. 4	REV 5	REV. 6

SEE SHEET 2 FOR LATEST ISSUE

DATE. 15/08/74

DRAWN BY.

CHECK

NEXT DRAWING

Rev 6 - 23468

datron ELECTRONICS LTD.

TITLE

1041 AC CONVERTOR (01)
1051

DRAWING NUMBER 400 037

SHEET 1 OF 13

	PART No.		MANUFACTURER	PART No.	Per Assy.
C1	130 006	82pF 5% 160V PS	Suflex		1
C2	104019	27pF ±1pF 750V	ERIE	N150/BD	1
C3	104 020	22pF ±1pF 750V	ERIE	N150/AD	1
C4	170003	100MF 10% 15v WET TANT		69F245	2
C5	130 025	22pF ±1pF 160V PS	Suflex		3
C6	140 008	10pF PTFE Trimmer	Jackson	VPC Tetfer	3
C7	130 013	18pF ±1pF 160V PS	Suflex		2
C8	120 001	.22mF 10% 1KV Polycarb	Facel		1
C9	130 056	1300pF 2.5% 63V PS	Suflex		1
C10	170003	100MF 10% 15v WET TANT		69F245	
C11	130 025	22pF ±1pF 160V PS	Suflex		-
C12	130 013	18pF ±1pF 160V PS	Suflex		-
C13	140 008	10pF PTFE Trimmer	Jackson	VPC Tetfer	-
C14	130 024	110pF 2.5% 160V PS	Suflex		1
C15	140 007	15pF PTFE Trimmer	Jackson	VPC Tetfer	2
C16	130 025	22pF ±1pF 160V PS	Suflex		-
C17	130 002	15pF ±1pF 160V PS	Suflex		1
C18	140 008	10pF PTFE Trimmer	Jackson	VPC Tetfer	-
C19	130 040	115 pF 25% 160V PS	Suflex		1
C20	140 007	15pF PTFE Trimmer	Jackson	VPC Tetfer	-
C21	130 012	1200pF 2.5% 63V PS	Suflex		1
C22	150 001	22MF 16v Tant Bead	Union Carbide	K22E16	6
C23	150 001	22MF 16v Tant Bead	Union Carbide	K22E16	-

NOTES.

REV. 3	REV. 4	REV. 5	REV. 6
ECO. 25	ECO. 39	ECO. 43	ECO. 54

SEE SHEET 2 FOR LATEST ISSUE

DATE. 15/08/74

DRAWN BY.

CHECK

NEXT DRAWING

Rev 6 2345

datron ELECTRONICS LTD.

TITLE 1041 AC CONVERTOR 1051

DRAWING NUMBER 400 037

SHEET 8 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
C24					
C25	102228	2·2pF 500V Cer Disc	Erie		1
C26					
C27	102 221	220pF 500V Cer Disc	Erie	831	1
C28	102 471	470pF 500V Cer Disc	Erie	801	4
C29	150 002	10mF 16V Tant Bead	Union Carbide	K10E16	4
C30		NOT USED			
C31	102 102	1000pF 500V Cer Disc	Erie	801	4
C32	102 101	100pF 500V Cer Disc	Erie	801	3
C33	102 102	1000pF 500V Cer Disc	Erie	801	-
C34	102 471	470 pF 500V Cer Disc	Erie	801	-
C35	102 471	470 pF 500V Cer Disc	Erie	801	-
C36	102 102	1000pF 500V Cer Disc	Erie	801	-
C37	150 002	10mF 16V Tant Bead	Union Carbide	K10E16	-
C38	150 002	10mF 16V Tant Bead	Union Carbide	K10E16	-
C39					
C40	101 103	.01mF 250V Cer Disc	Erie	801	1
C41	120 010	1.5mF 10% 160V PC	Advance Filmcap	CMR25A	1
C42	* 110 018	6.8mF 10% 63V PY	Advance Filmcap	MD45A	1
C43	110 009	1·0 mF 20% 100V PC	WIMA	MKS	1
C44	110 010	·22 mF 20% 250V PY	MULLARD	C280	1
C45	102 101	100pF 500V Cer Disc	Erie	801	-
C46	102 101	100pF 500V Cer Disc	Erie	801	-

NOTES.

* Issue 2 PCB uses 10mF (110 001) and 6.8mF (110 018) respectively.

REV. 3	REV. 4	REV. 5	REV. 6

SEE SHEET 2 FOR LATEST ISSUE

DATE.	15/08/74
DRAWN BY.	
CHECK	
NEXT DRAWING	

datron ELECTRONICS LTD.

TITLE

1041 AC CONVERTOR
1051

DRAWING NUMBER 400-037

	PART No.		MANUFACTURER	PART No.	Per Assy.
C47	102 220	22pF 500V Cer Disc	Erie	831	1
C48	102 470	47 pF 500V Cer Disc	"	"	1
C49	150 010	.33mF 35V Tant Bead	Union Carbide	KR33E35	1
C50	150 005	2.2mF 16V Tant Bead	Union Carbide	K2R2E16	1
C51	150 002	10mF 16V Tant Bead	Union Carbide	K10E16	-
C52	150 001	22mF 16V Tant Bead	Union Carbide	K22E16	-
C53	150 001	22mF 16V Tant Bead	Union Carbide	K22E16	-
C54	102 471	470pF 500V Cer Disc	Erie	801	-
C55-C56 - C59	*	Twisted Wire Pair			*
C57-C58	150 001	22mF/16V Tant Bead	Union Carbide	K22E16	-
C60	102 102	1000pf 500R Cer Disc	ERIE	801	-
D1	Not Used				
D2-6, D8+9, D12+13	200 001	Diode Sil GP Switch		IN4148	18
D7, D14, D15	210 056	Diode Zener 5.6V		BZY88C5V6	4
D16	210 100	Diode Zener 10V		BZY88C10V	1
D17	200 001	Diode Sil GP Switch		IN4148	
D18- D21	200 001	Diode Sil GP Switch		IN4148	-
D22- D24	220 010	Diode Sil Hot Carrier	HP	HSCH1001 / IN6263	3
D25- D28	200 001	Diode Sil GP Switch		IN4148	-
D29- D32, D10, D11	200 008	Diode Sil Low Leak		IN458A	6
D33	210 056	Diode Zener 5.6V		BZY88C5V6	-

NOTES.

* Use very stiff insulated wire about ½" long - guage approx. .8mm.
May use bare wire with insulating sleeving.

REV. 3	REV. 4	REV 5	REV. 6
ECO. 25	ECO. 39	ECO. 43	ECO. 54

SEE SHEET 2 FOR LATEST ISSUE

DATE. 15/08/74	datron ELECTRONICS LTD.
DRAWN BY.	TITLE 1041 AC CONVERTOR 1051
CHECK	
NEXT DRAWING Rev 6	DRAWING NUMBER 400 037
	SHEET 10 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
Q1	240 001	Sil N.P.N. Hi HFE GP		BC184K	4
Q2	230 003	N Fet GP Switch	Teledyne	U1899E/K4093-18	5
Q3	230 003	N Fet GP Switch		U1899E/K4093-18	-
Q4	230 003	N Fet GP Switch		U1899E/K4093-18	-
Q5	230 003	N Fet GP Switch		U1899E/K4093-18	-
Q6a, Q6b	230 009	Sil Monolithic Dual Fet		2N3956	1
Q7	240 013	Sil N.P.N. Hi HFE GP		BC184KC	1
Q8	240 011	Sil N.P.N. GP		BC338	1
Q9	230 003	N Fet GP Switch	Teledyne	U1899E/K4093-18	-
Q10	250 004	Sil P.N.P. HF GP		2N3906	6
Q11	240 001	Sil N.P.N. GP		BC184K	-
Q12	250 004	Sil P.N.P. HF GP		2N3906	-
Q13	250 004	Sil P.N.P. HF GP		2N3906	-
Q14	240 006	Sil N.P.N. HG GP		2N3904	2
Q15	240 001	Sil N.P.N. Hi HFE GP		BC184K	-
Q16	230 002	N Fet GP	Teledyne	U1994E/K4416-18	2
Q17	250 004	Sil P.N.P. HF GP		2N3906	-
Q18	250 004	Sil P.N.P. HF GP		2N3906	-
Q19	240 006	Sil N.P.N. HF GP		2N3904	-
Q20	250 004	Sil P.N.P. HF GP		2N3906	-
Q21	230 002	N Fet GP	Teledyne	U1994E/K4416-18	-
Q22	240 001	Sil N.P.N. Hi HFE GP		BC184K	-
Q23, Q24, Q25	230022	N Fet Switch		E106/2N5434	3

NOTES.

REV. 3	REV. 4	REV. 5	REV. 6

SEE SHEET 2 FOR LATEST ISSUE

DATE. 15/08/74

DRAWN BY.

CHECK

NEXT DRAWING Rev 6 2345

datron ELECTRONICS LTD.

TITLE 1041 AC CONVERTOR 1051

DRAWING NUMBER 400 037

SHEET 11 OF 13

	PART No.		MANUFACTURER	PART No.	Per Assy.
M1	260 009	Wide Band Op Amp	National	LM318H	1
M2	260025	Precision GP Op Amp	National	LM101	4
M3	260025	Precision GP Op Amp	National	"	-
M4	260025	Precision GP Op Amp	National	"	-
M5	260025	Precision GP Op Amp	National	"	-
M6	290 026	RMS Module Kit	Datron		1
	510999	WIRE 7/0-2 WHITE			A/R
K1 , K2	330003	Relay	A.M.F.	R10-E1-L2-Q5·8K	2
	459112	RELAY BRACKET			2
	410 006 - 8	Printed Circuit Board			1
	400084	AC. INPUT LEAD ASSY.			1
	604 004	Pin Plugs	Amp	1 - 163749 - 2 (1)	1
	450 012	GUARD SHIELD			1
	612 005	Stand-Off Rivet M3	Harwin		4
	620 001	Cloverleaft Bush	Sealectro		8
	620 003	Rivet Solder Terminal	Harwin	H2105A	7
	602 001	FSV Terminals	Molex	02 - 04 - 1875	26
	630 003	P Clip $\frac{1}{4}$"			1
	611 016	M3 x 8 Pozipan	GKN		7
	590 011	BLACK SLEEVE	HELLARMAN	H15	A/R
	615 002	M3 Hex Nut			3
	613 005	M3 Shkprf Washer			7

NOTES.

(1) Strip of 13 pins

REV. 3	REV. 4	REV. 5	REV. 6
ECO. 25	ECO. 38	ECO. 43	ECO. 54

SEE SHEET 2 FOR LATEST ISSUE

DATE. 15/08/74	datron ELECTRONICS LTD.
DRAWN BY.	TITLE 1041 AC CONVERTOR 1051
CHECK	
NEXT DRAWING Rev 6 2345	DRAWING NUMBER 400 037
	SHEET 12 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
	540002	22 SWG TINNED CU WIRE			A/R
	590004	SILICON RUBBER SLEEVE			A/R
	602004	BREAKAWAY TERMINAL STRIP.	MOLEX	1938-4.	18.
	590001	HELLERMAN SLEEVES BLACK.	HELLERMAN	H15 x 20MM LG	3.

NOTES.

ISS.	DATE	DRAWN	CHECK	DESCRIPTION
SEE SHT 2				

DATE 7.4.77

DRAWN BY P.J.H

CHECK

NEXT DRAWING

datron ELECTRONICS LTD

TITLE AC OPTION 01

DRAWING NUMBER 400037

SHEET 13 OF 13

J. W. 1164

R1 - R5	070 066	10K 0·1% ¼W WW	Mann	MX125B	5
R6	070 121	500R 0.1% ¼W WW	Mann	3C	1
R8	070 089	4.53K 0.1% ¼W WW	Mann	MX125B	1
R9	070 090	44.9K 0.1% ¼W WW	Mann	MX125B	1
R10	070 108	449K 0.1% ¼W WW	Mann	MX500B	1
R11	015 603	560K 1% ¼W MF	Welwyn	4033C	1
R12 - R13	011 002	10K 1% ¼W MF	Welwyn	4033C	2
R14	090 003	Matched Pair MF 2M2	Erg		1 Set
R15		2K2/2M2 0·2% 2K2			
R16 - R17	440 026	FSV (150K - 3M3)			1 of Kit
R18 - R19	440 027	FSV (560K - 4M7)			1 of Kit
R20	014 708	47R 1% ¼W MF	Welwyn	4033C	1
R21	000 224	220K 5% ¼W Carbon	Mullard	CR25	1
R22	004 681	680R 5% ½W Met-Ox	Electrosil	TR5	1
R23	000 824	820K 5% ¼W Carbon	Mullard	CR25	1
R24	000 476	47M 10% ¼W Carbon	Allen Bradley	CB10	1
R25	000 473	47K 5% ¼W Carbon	Mullard	CR25	3
R26 - R32	000 104	100K 5% ¼W Carbon	Mullard	CR25	7
R33 - R39	000 106	10M 10% ¼W Carbon	Mullard	CR25	8
R40 - R41	000 473	47K 5% ¼W Carbon	Mullard	CR25	-
R42	000 106	10M 10% ¼W Carbon	Mullard	CR25	-
R43	000 562	5k6 ¼W Carbon	Mullard	CR25	1
R44	000 474	470K 5% ¼W Carbon	Mullard	CR25	1

NOTES.

PROD APP LAD 2.2.77

ISS. 2	ISS. 3	ISS. 4	ISS. 5	6	7	8	9	10	11	12	13	14		
ECO. 19	E.CO 35	ECO. 102	ECO. 133	180	206	273	414	519	633	602	658	683		

DATE. 18/09/74
DRAWN BY.
CHECKED
NEXT DRAWING
Rev

datron ELECTRONICS LTD.

TITLE 1041 RESISTANCE CONVERTOR (02)

DRAWING NUMBER 400 036

SHEET 2 OF 5

	PART No.		MANUFACTURER	PART No.	Per Assy.
R45	000 103	10K 5% ¼W Carbon	Mullard	CR25	1
R46	000 225	2M2 10% ¼W Carbon	Mullard	CR25	1
R47 - R48	090 001	PTC Thermistor	Mullard	VA 8650	2
R49 - R50	063 500	50R ⅜" Cermet Pot	Beckman	72P	2
R51	063 100	10R ⅜" Cermet Pot	Beckman	72P	1
R52	063 504	500K ⅜" Cermet Pot	Beckman	72P	1
R53	063 201	200R ⅜" Cermet Pot	Beckman	72P	1
R54	063 202	2K ⅜" Cermet Pot	Beckman	72P	1
R55	063 205	2M ⅜" Cermet Pot	Beckman	72P	1
R56	000 105	1M 5% ¼W Carbon	Mullard	CR25	1
R57 - R58	000 222	2K2 5% ¼W Carbon	Mullard	CR25	2
R59	063 204	200K ⅜" Cermet Pot	Beckman	72P	1
R60	000 123	12k 5% ¼W Carbon	Mullard.	CR25	1
C1	102 102	1KpF 500V Cer Disc	Erie	801	2
C2 - C3	102 471	470pF 500V Cer Disc	Erie	801	2
C4	102 221	220pF 500V Cer Disc	Erie	801	1
C5	102 102	1KpF 500V Cer Disc	Erie	801	-
D1 - D7, D27	200 008	Low Leakage Diode	Fairchild	IN458A	10
D8 - D26, D28	200 001	GP Sil. Diode	Fairchild	IN4148	20
D31	213 001	10V 5W Zener		IN5347	3
D32 - D34	200 006	Sil Rect Hi Volt		IN4005	3
D35, D40	200 008	Low Leakage Diode	Fairchild	IN458A	-
D36 - D37	213 001	10V 5 W Zener		IN5347	-
D39	210 033	3V3 400mW Zener	BZY88C 3V3	1 OFF	

NOTES.

ISS. 2	ISS. 3	ISS. 4

DATE.	18/09/74
DRAWN BY.	
CHECK	
NEXT DRAWING	
Rev	K34

datron ELECTRONICS LTD.

TITLE 1041 RESISTANCE CONVERTOR (02)

DRAWING NUMBER 400 036

SHEET 3 OF 5

Q1	250 001	Transistor Sil P.N.P. GP	Waycom	BC214K	1
Q2	239 020	N Fet Sil GP Switch	Teledyne	U1899E (WHITE)	1
Q3 - Q8	230 002	N Fet Sil GP	Teledyne	U1994E/K4416-18	6
Q9	240 012	Transistor Sil N.P.N. 1 Watt	Motorola	2N3053	1
Q10	250 006	Transistor Sil P.N.P. GP	Fairchild	BC322	1
Q11		NOT USED			
M1	290 012	Linear IC 741	Fairchild	741 HC (RED/ORANGE)	1
M2	290 004	Linear IC LM312 Sel	National	LM312H Sel Red Spot	1
M3	290 014	Linear IC LM312 Sel	National	LM312H Sel (GREEN/ORANGE)	1
RL1	330 001	Relay BiF 4P2W 28V	Potter & Brumfield	R10-E1-L4-Q2-5K	1
	459 112	Relay Bracket	KDP ES	459 112	1
J1	604 004	13 Way Amp Male CNCTR	Amp	1-163749-2	1 Set
	410 007-5A	PCB			
	602 001	FSV Terminal	Molex	02-04-1875	8
	612 005	23mm x M3 Rivet SNDF	Harwin	CS	3
	620003	Rivet Solder Terminal	Harwin	H2105A	9
	630003	P - Clip	Plex		2
	611004	M3 x 6 Pozipan	GKN		6
	615002	M3 Nut	GKN		3
	613005	M3 Shakeproof Washer	GKN		6

NOTES.

ISS 2 ISS 3

ECO 4 ECO. 55

DATE. 18/09/74	datron ELECTRONICS LTD.
DRAWN BY.	TITLE 1041 RESISTANCE CONVERTOR (02)
CHECK	
NEXT DRAWING	
Rev A 3	DRAWING NUMBER 400 036 SHEET 4 OF 5

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
	450 011	GUARD SHIELD			1
	510 222	WIRE 7/0·2 RED PVC			A/R
	590 001	SLEEVING BLACK	HELLERMAN	HIS x 20	27
	540 001	TINNED CU WIRE			A/R.
	400065/A	INPUT CABLE ASSY.			1
	400065/B	INPUT CABLE ASSY.			1

NOTES.

SEE SHT 2 FOR LATEST ISSUE

ISS.								

DATE 30.9.76

DRAWN BY

CHECK

NEXT DRAWING

datron ELECTRONICS LTD

TITLE RESISTANCE CONVERTOR (02)

DRAWING NUMBER 400 036

SHEET 5 OF 5

DESCRIPTION	DATRON PART No.	DESCRIPTION	MANUFACTURER	PART No.	Per Assy.
R1 - R28		Not Used			-
R29-R31	000 273	27K 5% ¼W Carbon	Mullard	CR25	4
R32	000 104	100K 5% ¼W Carbon	Mullard	CR25	7
R33	000 103	10K 5% ¼W Carbon	Mullard	CR25	17
R34	000 471	470R 5% ¼W Carbon	Mullard	CR25	2
R35	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R36	000 471	470R 5% ¼W Carbon	Mullard	CR25	-
R37	063 102	1K ⅜" Cermet Pot	Beckman	72P	1
R38	018 251	8k25 1% ½W Metal Film	Welwyn	4033C	2
R39	018 251	8k25 1% ½W Metal Film	Welwyn	4033C	-
R40	000 102	1K 5% ¼W Carbon	Mullard	CR25	3
R41	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R42	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R43	000 222	2K2 5% ¼W Carbon	Mullard	CR25	7
R44	000 102	1K 5% ¼W Carbon	Mullard	CR25	-
R45	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R46	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R47	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R48	000 331	330R 5% ¼W Carbon	Mullard	CR25	6
R49	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R50	000 393	39K 5% ¼W Carbon	Mullard	CR25	1
R51	000 331	330R 5% ¼W Carbon	Mullard	CR25	-
R52	000 104	100k 5% ¼W Carbon	Mullard	CR25	-

NOTES.	ISS. 23.	24 C	25	26	27	28 C	29
	ECO. 613 626	625.	642/648	659/672	679/730	709/732	740
ISS 16	ISS 17	ISS 18	ISS 19	ISS. 20	ISS. 21	ISS 22	
398	418	388	514	523	548	610.	
ISS. 3	ISS. 4	ISS. 5	ISS. 6	ISS. 7	ISS. 8	ISS. 9	10 11 12 13 14 15
ECO. 18	ECO. 30	ECO 67	ECO. 75	ECO. 82	ECO. 86	ECO. 116	149 159 186 219 284 324

PROD APP LAD. 2·2·77

DATE. 23/11/73
DRAWN BY. N.D
CHECK
NEXT DRAWING
REV

datron ELECTRONICS LTD.

TITLE 1041 A-D PCB ASSY

DRAWING NUMBER 409120A

SHEET 2 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R53	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R54	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R55	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R56	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R57	000 223	22K 5% ¼W Carbon	Mullard	CR25	8
R58	000 223	22K 5% ¼W Carbon	Mullard	CR25	-
R59	000 223	22K 5% ¼W Carbon	Mullard	CR25	-
R60	000 331	330R 5% ¼W Carbon	Mullard	CR25	-
R61	000 331	330R 5% ¼W Carbon	Mullard	CR25	-
R62	000 222	2K2 5% ¼W Carbon	Mullard	CR25	-
R63	000 222	2K2 5% ¼W Carbon	Mullard	CR25	-
R64	000 561	560R 5% ¼W Carbon	Mullard	CR25	1
R65	000 331	330R 5% ¼W Carbon	Mullard	CR25	-
R66	000 331	330R 5% ¼W Carbon	Mullard	CR25	-
R67	000 223	22K 5% ¼W Carbon	Mullard	CR25	-
R68		NOT USED			
R69-R70	440 020	FSV (22K 5% Carbon)	Mullard	CR25	1 of Kit
R71	000 223	22K 5% ¼W Carbon	Mullard	CR25	-
R72	000 821	820R 5% ¼W Carbon	Mullard	CR25	1
R73	070 082	1KO .1% ¼W WW	Mann	M3C-B	1
R74	000 272	2K7 5% ¼W Carbon	Mullard	CR25	2
R75	063205	2M CERMET POT	Beckman	72P	2
R76	070 083	4KO .1% ¼W WW	Mann	M3C-B	1

NOTES.

DATE.	
DRAWN BY.	JRC
CHECK.	JRC
NEXT DRAWING	

datron ELECTRONICS LTD.

TITLE 1041 A-D PCB

DRAWING NUMBER 409120A

SHEET OF 3 3

ISS. 3 | ISS. 4

SEE SHEET 2 FOR LATEST ISSUE

	PART No.		MANUFACTURER	PART No.	Per Assy.
R77 - R79	000 563	56K 5% ¼W Carbon	Mullard	CR25	4
R80	000 563	56K 5% ¼W Carbon	Mullard	CR25	-
R81	000 332	3K3 5% ¼W Carbon	Mullard	CR25	2
R82	000 222	2K2 5% ¼W Carbon	Mullard	CR25	-
R83	000 562	5K6 5% ¼W Carbon	Mullard	CR25	3
R84	000 222	2K2 5% ¼W Carbon	Mullard	CR25	-
R85	070 084	13K0 1% ¼W WW	Mann	MX12SB	1
R86	063 500	50R ⅜" Cermet Pot	Beckman	72P	2
R87	440 021	FSV 220K 1% ¼W MF	Welwyn	4033C	2 of Kit
R88	011 211	1K21 1% ¼W MF	Welwyn	4033C	1
R89	070 066	10K0 .1% ¼W WW	Mann	MX12SB	3
R90	000 562	5K6 5% ¼W Carbon	Mullard	CR25	-
R91	000 272	2K7 5% ¼W Carbon	Mullard	CR25	-
R92	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R93	000 475	4M7 10% ¼W Carbon	Mullard	CR25	1
R94	070 066	10K0 .1% ¼W WW	Mann	MX12SB	-
R95	063 500	50R ⅜" Cermet Pot	Beckman	72P	-
R96.	070 066	10K0 .1% ¼W WW	Mann	MX12SB	-
R97	000 472	4K7 5% ¼W Carbon	Mullard	CR25	4
R98	063205	2M CERMET POT	BECKMAN	72P	-
R99	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R100	000 223	22K 5% ¼W Carbon	Mullard	CR25	-
R101	014 752	47K5 1% ¼W MF	Welwyn	4033C	1

NOTES.

DATE.	datron ELECTRONICS LTD.
DRAWN BY.	
CHECK	
NEXT DRAWING	TITLE: 1041 A-D PCB
Rev 4	DRAWING NUMBER 409120A
	SHEET 4 OF 13

ISS. 3 ISS. 4
ECO. 18 ECO. 30

SEE SHEET 2 FOR LATEST ISSUE

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R102	000 225	2M2 10% ¼W Carbon	Mullard	CR25	1
R103	000 473	47K 5% ¼W Carbon	Mullard	CR25	1
R104-R105	440 019	FSV (1M 5% ¼W Carbon)	Mullard	CR25	1 of Kit
R106	063 202	2K ⅜" Cermet Pot	Beckmann	72P	1
R107	000 472	4K7 5% ¼W Carbon	Mullard	CR25	-
R108	000 562	5K6 5% ¼W Carbon	Mullard	CR25	-
R109	000 107	100M 20% ¼W Carbon	AB	CB10	1
R110	000 222	2K2 5% ¼W Carbon	Mullard	CR25	-
R111	000 124	120K 5% ¼W Carbon	Mullard	CR25	1
R112		FSV (6K8 5% Carbon)	Mullard	CR25	-
R113	000 332	3K3 5% ¼W Carbon	Mullard	CR25	-
R114	000 102	1K 5% ¼W Carbon	Mullard	CR25	-
R115	000 470	47R 5% ¼W Carbon	Mullard	CR25	1
R116	000 152	1K5 5% ¼W Carbon	Mullard	CR25	2
R117	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R118	000 273	27K 5% ¼W Carbon	Mullard	CR25	-
R119	000 101	100R 5% ¼W Carbon	Mullard	CR25	1
R120	000 472	4K7 5% ¼W Carbon	Mullard	CR25	-
R121-R122	000 104	100K 5% ¼W Carbon	Mullard	CR25	-
R123	000 222	2K2 5% ¼W Carbon	Mullard	CR25	-
R124	000 472	4K7 5% ¼W Carbon	Mullard	CR25	-
R125	000 103	10K 5% ¼W Carbon	Mullard	CR25	-
R126-R128	000 104	100K 5% ¼W Carbon	Mullard	CR25	-

NOTES.

ISS. 3	ISS. 4
	SEE SHEET 2 FOR LATEST ISSUE

DATE.

DRAWN BY.

CHECK

NEXT DRAWING

datron ELECTRONICS LTD.

TITLE 1041 A-D PCB

DRAWING NUMBER 409120A

SHEET 5 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R129	000152	1K5 5% ¼W CARBON	MULLARD	CR25	–
R130	000103	10K " " "	"	"	–
R131	000223	22K " " "	"	"	–
R132	000223	22K " " "	"	"	–
R133	000684	680K " " "	"	"	1
R134	000100	10R " " "	"	"	1
R135	000476	47M 10% ¼W "	ALLEN BRADLEY	CB	1
R136	000226	22M 10% " "	ALLEN BRADLEY	CB	1.

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
E.C.O.													
DATE													
CHKD.													

DATE	datron ELECTRONICS LTD
DRAWN W.G. SMITH	TITLE 1041. A-D. P.C.B.
CHECKED	
APPROVED	
DATE	DRAWING NUMBER 409120A — SHEET 6 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
C1	180 004	4700mF F/16V Al. Elect	Wima	Printilyt 4700/16 New	1
C2	110 013	.1mF 20% 250V Py.	Mullard	C280AE P100K	1
C3	150 003	47mF/63V Dipped Tant	Union Carbide	K47E6	2
C4 - C10	101 103	.01mF 250V Cer. Disc	Erie	801	11
C11	102222	2200pF 250V Cer. Disc	ERIE	831	1
C12		NOT USED			
C13-C14	150 001	22mF/16V Dipped Tant	Union Carbide	K22E16	5
C15	102 221	220pF Cer. Disc	Erie	801	2
C16	110025	3300pF POLYESTER CAP	MULLARD	347 61332	1
C17	102471	470pF 500V Cer. Disc	Erie	801	1
C18	102 221	220pf 500V Cer. Disc	Erie	801	-
C19	102102	1000pF 500V Cer. Disc	Erie	831	5
C20	150 009	3.3mF/16V Tant Bead	Union Carbide	K3R3E16	1
C21	150 002	10 mF/16V Tant Bead	Union Carbide	K10E16	1
C22	110 004	.047mF. 20% 250V Py	Mullard	C280AE P47K	1
C23	180 005	1000mF/25V Al, Elect	Wima	Printilyt	2
C24	180 005	1000mF/25V Al. Elect	Wima	Printilyt	-

NOTES.

ISS. 3	ISS. 4

SEE SHEET 2 FOR LATEST ISSUE

DATE.	
DRAWN BY.	
CHECK	MF
NEXT DRAWING	

datron ELECTRONICS LTD.

TITLE: 1041 A-D PCB.

DRAWING NUMBER: 409120A

	PART No.		MANUFACTURER	PART No.	Per Assy.
C25	150 001	22mF/16V Dipped Tant	Union Carbide	K22E16	-
C26	150 001	22mF/16V Dipped Tant	Union Carbide	K22E16	-
C27-C28	102 470	47pF Cer. Disc	Erie	831 or 801	2
C29	102 102	1KpF Cer. Disc	Erie	831	-
C30-C31	102 101	100pF 500V Cer. Disc	Erie	831	3
C32-C33	102 102	1KpF Cer. Disc	Erie	831	-
C34	110 011	.47mF/100V Py	Wima	MKS 100V	1
C35	140 002	.47mF/400V d.c. 10% Polypro	Wima	MKP 10	1
C36	102 101	100pF Cer. Disc	Erie	801 or 831	-
C37	101 103	·01mF Cer. Disc	Erie	831	-
C38					
C39					
C40	101 103	·01mf CER DISC	Erie	801	-
C41	NOT REQUIRED				
C42	101 103	·01mf CER DISC	Erie	801	-
C43	101 103	.01mF Cer. Disc	Erie	801	-
C44	Not Used				
C45-C46	140019	150pF. 1%. 400v. SILVERED MICA	I.T.T.	454/52-150pf	2
C47	102 102	1kpF Cer. Disc.	Erie	801	-
C48	150 001	22mF/16v DIPPED TANT	UNION CARBIDE	K22E16	-
C49	150003	47 µF/6·3v DIPPED TANT	" "	K47E6V3	-
C50, C51, C52	102330	33pf Cer Dis	ERIE	801	3.

NOTES.

ISS. 3	ISS. 4
ECO. 18	ECO 30

SEE SHEET 2 FOR LATEST ISSUE

DATE.	datron ELECTRONICS LTD.
DRAWN BY.	
CHECK IAT	TITLE 1041 A-D PCB
NEXT DRAWING REV 4	DRAWING NUMBER 409120A
	SHEET 8 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
D1 - D3	200 001	Sil Gen Purpose		IN4148	16
D4 - D6	200 005	Germ Gen Purpose	Emihus	HG5009	3
D7	200 001	Sil Gen Purpose		IN4148	-
D8	210 100	10V 400mW Zener		BZY88 C10V	1
D9 - D10	209 009	Matched Pair of 1N 458A			1
D11	200 008	Sil LOW LEAKAGE		IN458A	1
D12	214 002	TC Reference Zener 6.2V	Centralab (Lucas)	IN827A	1
D13 - D24	200 001	Sil Gen Purpose		IN4148	-
W1	209 011	2.0 Amp 100V Rect. Bridge	µ.E.	S01	1
W2	209 004	1.0 Amp 100V Rect. Bridge	G.I.	W01	2
W3	209 004	1.0 Amp 100V Rect. Bridge	G.I.	W01	-

NOTES.

ISS. 3	ISS. 4
	SEE SHEET 2 FOR LATEST ISSUE

DATE.
DRAWN BY.
CHECK MRP
NEXT DRAWING

datron ELECTRONICS LTD.

TITLE 1041 A-D PCB

DRAWING NUMBER 409120A

SHEET OF

3/19

	PART No.		MANUFACTURER	PART No.	Per Assy.
Q1	240 006	Sil N.P.N. HF GP	Fairchild	2N 3904	5
Q2	240 006	Sil N.P.N. HF GP	Fairchild	2N 3904	-
Q3 - Q5 - Q6	239 011	Matched set of 3 Fets	Datron Sel. Teledyne	3 x U1994E ΔRon <30Ω	1 Set
Q4	230 002	Fet N Junct GP	Teledyne	U1994E/K4416-18	1
Q7	240 006	Sil N.P.N. HF GP		2N3904	-
Q8	240 006	Sil N.P.N. HF GP		2N3904	-
Q9	250 004	Sil P.N.P. HF GP		2N3906	3
Q10	240 001	Sil N.P.N. HiB GP		BC184K	4
Q11	240 001	Sil N.P.N. HiB GP		BC184K	-
Q12	240 001	Sil N.P.N. HiB GP		BC184K	-
Q13	240 001	Sil N.P.N. HiB GP		BC184K	-
Q14	250 004	Sil P.N.P. HF GP		2N3906	-
Q15	250 004	Sil P.N.P. HF GP		2N3906	-
Q16	240 007	Sil N.P.N. HF Switch		2N3646	2
Q17	240 007	Sil N.P.N. HF Switch		2N3646	-
Q18	240 009	Sil N.P.N. 80V Driver	Motorola	MPSL01	3
Q19	240 009	Sil N.P.N. 80V Driver		MPSL01	-
Q20	240 009	Sil N.P.N. 80V Driver		MPSL01	-
Q21	240 006	Sil N.P.N. HG GP	Fairchild	2N3904	-

NOTES.

ISS. 3	ISS. 4
ECO 18	ECO 30

SEE SHEET 2 FOR LATEST ISSUE

DATE.

DRAWN BY.

CHECK JKP

NEXT DRAWING

REV 4

datron ELECTRONICS LTD.

TITLE 1041 A-D PCB

DRAWING NUMBER 409120A

SHEET 10 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
M1	270 001	Dig IC Quad Nand		7400N Commerical	7
M2	Not Used				
M3	270 024	Dig IC 7Seg Decode	Sperry	DD700, DM8880	4
M4-M6	270 024	Dig IC 7Seg Decode		DD700	-
M7-M8	270 001	Dig IC Quad Nand		7400N Commercial	-
M9	270 006	Dig IC Hex Inv		7405N Commercial	1
M10-M13	270 026	Dig IC Quad Latch		74L75N Commercial	4
M14	270 005	Dig IC Hex Inv		7404N Commercial	1
M15	270 027	Dig IC Dual D FF		74L74N Commercial	2
M16	270 008	Dig IC Triple Nand		7410N Commercial	2
M17-M20	270 025	Dig IC Decade Count		74L90N Commercial	4
M21-M22	270 013	Dig IC Dual D FF		7474N Commercial	2
M23	270 001	Dig IC Quad Nand		7400N Commercial	-
M24	290 003	Timer Monostable	Signetics	NE555V Commercial	1
M25	270 002	Dig IC Quad Nand		7401N Commercial	1
M26	270 001	Dig IC Quad Nand		7400N Commercial	-
M27	270 008	Dig IC Triple Nand		7410N Commercial	-
M28	270 001	Dig IC Quad Nand		7400N Commercial	-
M29	270 023	Dig IC Quad Nand Buffer		7437N Commercial	1
M30	270 001	Dig IC Quad Nand		7400N Commercial	-
M31	270 027	Dig IC Dual D FF		74L74N Commercial	-
M32	260 009	Linear IC LM318	National	LM318H	1
M33	260025	Linear IC LM101A Op Amp	National	LM101AH	4

NOTES.

DATE.	datron ELECTRONICS LTD.
DRAWN BY.	
CHECK IRP	TITLE 1041 A-D PCB
NEXT DRAWING	
	DRAWING NUMBER 409120A SHEET 11 OF 12

ISS. 3	ISS. 4

SEE SHEET 2 FOR LATEST ISSUE

	PART No.		MANUFACTURER	PART No.	Per Assy.
M34	260025	GEN PURPOSE OP AMP	NATIONAL	LM101AH	–
M35	260025	" " " "	"	LM101AH	–
M36	260 025	GEN PURPOSE Op Amp	NATIONAL	LM101AH	–
M37	260 005	Linear IC Power Regulator			
		5V	Motorola	MC7805	1
M38	260 017	Linear IC Power Regulator			
		15V	Motorola	MC78M15CP	2
M39	260 017	Linear IC Power Regulator			
		15V	Motorola	MC78M15CP	–
	450177-1	GUARD SHIELD			1
	604017	MAINS CONNECTOR	MOLEX	AE 3003	1
	612004	M3 x 4mm STANDOFF	HARWIN	CS2116-B	2
	612005	M3 x 22.2mm STANDOFF	"	CS2116-C	1
	612008	M3 x 6mm STANDOFF	CAMBION	350-5138-09-07	3.
	611005	SCREW M3x12mm STEEL POZIPAN	GKN	ZINC PLATED	1
	540002	22 SWG. BTC. WIRE			A/R
	900003	HEATSINK COMPOUND	R.S.	55-431-1	A/R
	590001	SLEEVE MAX CABLE ⌀3.0	HELLERMAN ELECTRIC	H15X20mm BLACK HELSYN	6
	900004	SILICON RUBBER COMPOUND	RS	554-119	A/R
	700020	SWITCH BUTTON CHROME			3
	613007	M3 PLAIN WASHER	GKN		2
	611019	M3x35 POZIPAN	GKN		1

NOTES.

ISS.3	ISS.4
ECO.18	ECO.30

SEE SHEET 2 FOR LATEST ISSUE

DATE.	datron ELECTRONICS LTD.
DRAWN BY.	
CHECK	TITLE 1041 A-D PCB
NEXT DRAWING	
Rev 4	DRAWING NUMBER 409120A
	SHEET 12 OF 13

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
TR1	300 007	Toroidal Mains Tx	Plessey Windings		1
TR2, TR3	310 002	Pulse Tx (Logic)	Newport Inst.	76616/4HV	2
	605059	8 WAY D.I.L SOCKET	ASTRALUX	ICL-083-S6T	1
J3	605 002	16 way D.I.L. Socket	Antiference	ICN-163-53	1
	613 005	M3 SHAKEPROOF	GKN		8
	620 003	PCB Solder Terminal	Harwin	H2105A	11
	602 001	FSV Terminal	Molex	0204 1875	14
	601 002	Connector Terminal	Amp	60803-1	14
	459 138	Transistor Heat Dissipator	KDP ES	459138	2
	459 139	Heat Dissipator	KDP ES	459139	1
	419 108A-6	P.C.B.			1
	618 001	Transistor Mounting Kit			3
	611 006	M3 x 10mm Pozipan	GKN		4
	611 007	M3 x 6mm Pozipan	GKN		2
	615 002	M3 Nut	GKN		4
	630033	½" x 28 S.W.G. BRASS STRIP			30mm
	615010	M3 NYLOCK NUT	GKN		1
	605 038	16 way D.I.L. Skt	Astralux	ICL 163-S6T	8
	605 037	14 way D.I.L. Skt	"	ICL 143-S3T	21
	605058	42 WAY D.S. 1" PCB Conn + KEY IN 21	Pye	MLD21SN0101ML/M62-21	1
S1	700 005	Switch PCB Push On Push Off	Lipa & Isostat	CD 15 2 Pole	2
S2	700 039	Switch PCB Momentary	Lipa & Isostat	CD 15 2 Pole	1
S3	700 005	Switch PCB Push On Push Off	Lipa & Isostat	CD 15 2 Pole	-

NOTES.

DATE.	datron ELECTRONICS LTD.
DRAWN BY.	
CHECK IRP	TITLE 1041 A-D PCB
NEXT DRAWING	
	DRAWING NUMBER 409130A SHEET 13 OF 13

ISS. 3 | ISS. 4

SEE SHEET 2 FOR LATEST ISSUE

	PART No.		MANUFACTURER	PART No.	Per Assy.
R1	000 101	100R 5% ¼W Carbon	Mullard	CR25	1
R2	000 221	220R 5% ¼W Carbon	Mullard	CR25	1
R3	000 562	5K6 5% ¼W Carbon	Mullard	CR25	8
R4	000 562	5K6 5% ¼W Carbon	Mullard	CR25	-
R5	000 681	680R 5% ¼W Carbon	Mullard	CR25	1
R6 - R10	000 562	5K6 5% ¼W Carbon	Mullard	CR25	-
R11	Not Used				
R12	000 223	22K 5% ¼W Carbon	Mullard	CR25	1
R13	000 102	1K 5% ¼W Carbon	Mullard	CR25	2
R14	000 102	1K 5% ¼W Carbon	Mullard	CR25	-
R15	000 682	6K8 5% ¼W Carbon	Mullard	CR25	1
R16 - R18	000 153	15K 5% ¼W Carbon	Mullard	CR25	3
R19	000 224	220K 5% ¼W Carbon	Mullard	CR25	1
R20	000 562	5K6 5% ¼W Carbon	Mullard	CR25	-
R21	000 273	27K 5% ¼W Carbon	Mullard	CR25	1
C1	150 003	47mF 6.3V Tant Bead	Union Carbide	K47E6	1
C2	110 013	.1mF 250V 20% PY	Mullard	C280 AE P100K	1
C3 - C4	110 026	.0068mF 100V PY	Wima	FKS-2-MIN	2
L1	370 001	10mH RF Choke	Plessey	58/10/0011/10	1
D1 - D2	200 001	Diode Sil Gen Purpose		IN4148	2
D3	200 002	Sil Rect Diode 100V	G.I.	IN4001	1
W1	209 007	Bridge Rectifier 400V		W04	1

NOTES.

PCB App Lab. 2.2.77

ISS. 1	3	4	5	6	7	8	9
ECO-12	ECO 320	ECO 363	ECO 438	ECO 439	ECO 513	ECO 641	ECO 717.

DATE. 25/11/73
DRAWN BY. N.R
CHECK
NEXT DRAWING
ISS. 1

datron ELECTRONICS LTD.

TITLE
SPERRY .5" DISPLAY
PCB ASSY 1041

DRAWING NUMBER 400 026

SHEET 2 OF 3

DESIGNATOR	DATRON PART No.	DESCRIPTION	MANUFACTURER	PART No.	Per Assy.
Q1 - Q2	240 001	Sil N.P.N. Hi B GP		BC184K	2
Q3	240 011	Sil N.P.N. Med Power		BC338	1
Q5 - Q8	240 009	Sil N.P.N. Hi Volt GP	Motorola	MPSL01	4
M1	270 023	Quad Nand Buffer	National	7437N	1
FL1 - FL4	920 005	Filament Lamp 5V 60mA	G.I.	V683	4
DM1	800 002	Disp Module ±.1.8 .5"	Sperry	SP351	1
DM2	800 003	Disp Module 888 .5"	Sperry	SP353	1
	800009	SOCKET 2 DIGIT .5"	SPERRY	CS352	1
T1	300 006	Toroidal Tx 5-0-5 TO 190			1
	800010	SOCKET 3 DIGIT .5"	SPERRY	CS353	1
	604 003	Connector Strip Pins 11 Way	Amp	163740-9	4
	605037	D.I.L. Socket 14 WAY	Astralux	ICL 143-S3T	1
	410 010-4A	THP PCB			1
	613 011	6BA NYLON WASHER	NYLONIC ENG. CO. LTD.	7801	4
	611 004	Screw M3 x 6 Pozipan			1
	611 014	Screw No4 x 3/8" Self tapping			1
	450 003	Function Block Inj. Mould	Norwich Plastics		1
	420 013	F.mV. Disp Negative			1

NOTES.

DATE.	25/11/73
DRAWN BY.	
CHECK	
NEXT DRAWING	ISS. 1

datron ELECTRONICS LTD.

TITLE
SPERRY .5" DISPLAY
PCB ASSY 1041

DRAWING NUMBER 400 026

SHEET 3 OF 3

ISS.	
ISS. 1	3

SEE SHT 2 FOR LATEST ISSUE

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
	605001	50 WAY AMP. SKT. (PANEL MNT)	AMPHENOL	57-40500	1
	604001	50 WAY AMP. SKT. (CABLE MNT)	AMPHENOL	57-30500	1
	410013-4	P.C.B.			1

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS	1												
ECO	—												
DATE	3.3.78												
CHKD	MD												

DATE 3.3.78	datron ELECTRONICS LTD
DRAWN K.S.S.	TITLE 1030/41/45 BCD BOARD ASSY. (BOI)
CHECKED MD	
APPROVED	
DATE	DRAWING NUMBER 400348 — SHEET 2 OF 2

LW. 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R1	000104	100k ¼W CARBON	MULLARD	CR25	1
R2	000103	10k ¼W CARBON	"	"	1
R3	000563	56k ¼W CARBON	"	"	1
C1	110005	0·01MF.20%POLYESTER	MULLARD	C280AE/P10k	1
C2	102102	1000pF CER. DISC	ERIE		1
C3	102100	10pF CER. DISC	ERIE	801	1
C4	150002	10MF, 16v DIPPED TANT	UNION CARBIDE	K10E16	1
C5	110013	0·1MF.20%.POLYESTER	MULLARD	C280AE/P100k	1
Q1	240001	BC184 NPN G.P.		BC184k	1
D1, D2	200005	DIODE HG5009	HUGHES	HG5009	2
M1	270017	QUAD 2 I/P NAND L P		74L00	1
M2	270021	QUAD 2WAY SELECT LP		74L157	1
M3	290003	TIMER / MONOSTABLE		NE555V	1
	604001	50 WAY AMPHENOL PLUG	AMPHENOL	57-30500	1
	410013-8	PCB			1
	605001	50 WAY AMPHENOL SKT.	AMPHENOL	57-40500	1
	605037	14 WAY DIL SOCKET	ASTRALUX	ICL143-S3T	1
	605038	16 WAY DIL SOCKET	ASTRALUX	ICL163-S6T	1
	605059	8 WAY DIL SOCKET	ASTRALUX	ICL·083-S6T	1
	620003	SOLDER TERMINAL	HARWIN	H2505A	1
	601002	CONNECTOR TERMINAL	AMP	60803-1	5

NOTES. * NOT TO BE FITTED ON 1041

ISS.	1	2	3	4	5	6	7	8
ECO		158	354	380-1	380-2	ECO 586	ECO. 622	ECO 733
	23.4.76	1.10.76	29.11.76	21.2.77	21.2.77	4-1-78	14.3.78	30-8-78

DATE 21.2.77
DRAWN BY JM
CHECK
NEXT DRAWING

datron ELECTRONICS LTD

TITLE BCD BOARD B01a
1030, 1041, 1045

DRAWING NUMBER 400058

SHEET 2 OF 2

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R1	000222	2K2, 5%, 1/4W, CARBON	MULLARD	CR 25	1
R2-R4	000103	10K, " " "	"	"	3
C1	150003	47μF, 6.3V DIPPED TANT	UNION CARBIDE	K47E6	1
Q1	240001	SIL., NPN, Hiβ, G.P.		BC184K	1
M1-M6	270030	DIG.I.C., HEX TRI-STATE BUF.	SIGNETICS	DM80L95	6
	4-10004-3	P.C. BOARD			1
	605001	50 WAY SKT. (PANEL MTG)	AMPHENOL	57-40500	1
	604001	50 WAY SKT (CABLE MTG)	AMPHENOL	57-30500	1
	605038	16 WAY DIL SKT	ASTRALUX	ICL-163-S6T	6
	620003	SOLDER TERMINAL	HARWIN	H2505A	1

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS	1												
ECO	—												
DATE	3.3.78												
CHKD	MD												

DATE 3-3-78	datron ELECTRONICS LTD
DRAWN K.S.S.	TITLE 1030, 1041, 1045. TRI-STATE BCD P.C.B. B02.
CHECKED MD	
APPROVED	DRAWING NUMBER 400349
DATE	SHEET 2 OF 2

W 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R1	000103	10k ¼W CARBON	MULLARD	CR25	7
R2	000103	10k ¼W CARBON	MULLARD	CR25	–
R3	000103	10k ¼W CARBON	MULLARD	CR25	–
R4	000103	10k ¼W CARBON	MULLARD	CR25	–
R5	000104	100k ¼W CARBON	MULLARD	CR25	1
R6	000103	10k ¼W CARBON	MULLARD	CR25	–
R7	000563	56k ¼W CARBON	MULLARD	CR25	1
R8, R9	000103	10k ¼W CARBON	MULLARD	CR25	–
C1	150003	47µF, 6.3v DIPPED TANT	UNION CARBIDE	K47E6	1
C2	102100	10pF CER. DISC	ERIE	801	1
C3	102102	1000pF CER. DISC	ERIE		1
C4	150002	10µF, 16v DIPPED TANT	UNION CARBIDE	K10E16	1
C5	110013	0·1µF. 20% POLYESTER	MULLARD	C280AE/P100K	1
C6	110005	0·01µF. 20% POLYESTER	MULLARD	C280AE/P10K	1
Q1	240007	SIL NPN G.P. TRANSISTOR		2N3646	1
Q2	240001	SIL NPN G.P. TRANSISTOR		BC184k	1
D1, D2	200005	DIODE HG5009	HUGHES	HG5009	2
M1	270030	HEX TRI STATE BUFFER	SIGNETICS	DM80L95	6
M2	270030	HEX TRI STATE BUFFER	SIGNETICS	DM80L95	–
M3	270030	HEX TRI STATE BUFFER	SIGNETICS	DM80L95	–
M4	270030	HEX TRI STATE BUFFER	SIGNETICS	DM80L95	–

NOTES.

ISS.	2	3	4	5	6	7	8	9
	REDRAWN	193	355	380-1	380-2	ECO 584	ECO 643	681/738
		12.3.76	16.12.76	21.2.77	21.2.77	1.11.77	6-4-78	30-8-78

DATE 21.2.77
DRAWN BY TH
CHECK
NEXT DRAWING

datron ELECTRONICS LTD

TITLE
TRI STATE BCD B02a
1030, 1041, 1045

DRAWING NUMBER 400023

SHEET 2 OF 3

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
M5	270030	HEX TRI STATE BUFFER	SIGNETICS	DM80L95	—
M6	270030	HEX TRI STATE BUFFER	SIGNETICS	DM80L95	—
M7	270017	QUAD 2 I/P NAND LP		74L00	1
M8	270021	QUAD 2WAY SELECT LP		74L157	1
M9	290003	TIMER / MONOSTABLE		NE555V	1
	410004-7A	PCB			1
	605001	50 WAY AMPHENOL SKT.	AMPHENOL	57-40500	1
	602005	8 WAY DIL BUCKET	MOLEX	2460-8	14
	602006	7 WAY DIL BUCKET	MOLEX	2460-7	2
	602004	DIL SOCKET STRIP	MOLEX	1938-4	156
	620003	SOLDER TERMINAL	HARWIN	H2505A	1
	601002	CONNECTOR TERMINAL	AMP	60803-1	5
	540001	TINNED COPPER WIRE			A/R
	590004	SILICON RUBBER SLEEVE			A/R
	604001	50 WAY AMPHENOL PLUG	AMPHENOL	57-30500	1
	605059	8WAY DIL SOCKET	ASTRALUX	ICL-083-S6T	1

NOTES.

DATE 21.2.77

DRAWN BY JH

CHECK

NEXT DRAWING

datron ELECTRONICS LTD

TITLE TRI STATE BCD B02a
1030, 1041, 1045

DRAWING 400023

SHEET 3

ISS.	SEE								

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
MODIFICATIONS	TO ANALOGUE	P.C.B. ASSY 400035			
REMOVE:- C14,	C19, C24, C25,	C26			
ADD:- C14	130003	1000pF 5% 160V POLYSTY.	SUFLEX	HS	1
C26	130007	3300pF " " "	"	"	1
MODIFICATIONS	TO DIGITAL	P.C.B. ASSY 409120			
	NOT REQUIRED				
					1

NOTES.

ISS.	2	3	4
E.C.O.	—	435	ECO 727
DATE	1-3-77	4-4-77	25.8.78

DATE 1.3.77
DRAWN BY M.J.D.
CHECK DCG
NEXT DRAWING
PROD L.A.D 2.3.77

datron ELECTRONICS LTD

TITLE FAST READ RATE OPTION 1041 (F.O.1)

DRAWING NUMBER 440037

SHEET 1 OF 1

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R1	000103	10K ¼W CARBON	MULLARD	CR25	1
M1	270001	DIG. I.C. QUAD NAND		7400N COMMERCIAL	1
	410084-1	P.C.B.			1
J17	604026	14 PIN D.I.L. PLUG	FLAIR	14-600-21	2
J18	604026	" " "	"	"	-
	602004	D.I.L. SOCKET STRIP	MOLEX	1938-4	70
	602006	7 WAY BUCKET	"	2460-7	10
	510888	7/.2 WIRE GREY			400 mm
C12 (SUPPLIED BUT NOT FITTED)	110005	0·01 µF 250V POLYESTER	MULLARD	C280 (20%)	1

NOTES.

ISS.	1	2	3
ECO	—	ECO 574	ECO 735
DATE	17.2.77	19-12-77	8-11-78

DATE 17.2.77
DRAWN BY M.J.D.
CHECK
NEXT DRAWING
PROD L.A.D. 17.2.77

datron ELECTRONICS LTD

TITLE SUPERFAST READ RATE OPTION SF1 1041

DRAWING NUMBER 400258

SHEET 2 OF 2

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R1	000 107	100M 10% ¼W CARBON	ALLEN BRADLEY	CB1071	1
R2-R5	008 006	56k THICK FILM	DUBILIER	RG-07	4
R6	000 124	120k 5% ¼W CARBON	MULLARD	CR25	3
R7	000 124	120k " " "	"	"	—
R8		F.S.V.			1
R9		F.S.V.			1
R10		NOT USED			—
R11		F.S.V.			1
R12		F.S.V.			1
R13		NOT USED			—
R14	063500	50R 3/8" CERMET POT.	BECKMAN	72P	1
R15, R20	070087	4k ·1% WIREWOUND	MANN	MX125B	2
R19	063101	100R 3/8" CERMET POT.	BECKMAN	72P	1
R21, R16	070067	20k ·1% WIREWOUND	MANN	MX125B	2
R22	000121	120R 5% ¼W CARBON	MULLARD	CR25	1
R23	000124	120k " " "	"	"	—
R24	063203	20k 3/8" CERMET POT	BECKMAN	72P	1
R25					
R26					
R27		NOT USED			—
R28	000103	10k 5% ¼W CARBON	MULLARD	CR25	3

NOTES.

ISS. 2	3	4	5	6	7	8		
ECO 135	ECO 189	ECO 204	ECO 275	ECO 417	ECO 691	ECO 760		
5.1.76	13.4.76	30.9.76	1.10.76	1.4.77	25.5.78	8 NOV 78		

DATE 5.1.76
DRAWN BY IV
CHECK DEJ
NEXT DRAWING
L.A.D. 28.7.78

datron ELECTRONICS LTD

TITLE 1041 - RATIO AMPL 1v 1/P

DRAWING NUMBER 400076

SHEET 2 OF 5

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R29	000 103	10k 5% ¼W CARBON	MULLARD	CR25	—
R30	000 272	2k7 " " "	"	"	1
R31	000 182	1k8 " " "	"	"	1
R32	000 103	10k " " "	"	"	—
R33, 34	000 564	560k " " "	"	"	2
C1	120021	0·47μF 10% 63v. POLYCARB.	ASHCROFT	A2B4711B.	2
C2	120021	0·47μF " " "	"	"	—
C3	102102	1000pF CER DISC	ERIE	801	2
C4	102102	1000pF " "	"	"	—
C5	120013	·15μF 10% 63v. POLYCARB	ADVANCE	CMD4	2
C6	120013	·15μF " " "	"	"	—
C7	102330	33pF 500v CER DISC	ERIE	831	1
C8	101103	·01μF CER DISC	"	801	3
C9	101103	·01μF " "	"	"	—
C10	101103	·01μF " "	"	"	—
D1-D4	200008	DIODE, LOW LEAKAGE	FAIRCHILD	IN458A	4
D5-D8	200001	DIODE, Si., G.P.		IN4148	4
M3	260025	LM101 OP. AMP	NATIONAL	LM101	1
M1-M2	290014	LINEAR LM312H OP. AMP.	NATIONAL	LM312H (GREEN/ORANGE)	2
M4	220005	OPTO-ISOLATOR FCD 820	FAIRCHILD	FCD 820	1
Q1-Q3	240001	SIL. NPN. GP.		BC184K	3

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS.								

DATE 5.1.76
DRAWN BY IV
CHECK
NEXT DRAWING

datron ELECTRONICS LTD

TITLE 1041 - RATIO AMPL. Iv I/P

DRAWING NUMBER 400076

SHEET 3 OF 5

J. W. 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
RL1	330003	RELAY 28v 3.2k BIF	POTTER & BRUMFIELD	R10-E1-L2-S3.2k	1
	602007	RELAY SOCKET	" "	A11-1	1
	630005	CLIP	" "	P28-1	1
S1	700019	SLIDE SWITCH	SIEMENS	C42315-A60-A1	1
	410015-6	P.C.B.	DATRON		1
	602001	FSV TERMINAL	MOLEX	02-04-1875	12
	612006	M3 SPACER x9·5mm	HARWIN		4
	611004	SCREW M3x6mm POZI-PAN	G.K.N.		4
	601002	CONNECTOR TERMINAL	AMP	60803-1	7
	620003	SOLDER TERMINAL	HARWIN	H-2105A	6
	510000	7/·2 P.V.C. INSUL. WIRE - BLACK	R.S. COMPONENTS		A/R
	510111	" " " " - BROWN	"		A/R
	510222	" " " " - RED	"		A/R
	510333	" " " " - ORANGE	"		A/R
	510555	" " " " - GREEN	"		A/R
	510666	" " " " - BLUE	"		A/R
	510777	" " " " - VIOLET	"		A/R
	510999	" " " " - WHITE	"		A/R
	511001	7/2 P.V.C. INSUL. WIRE - PINK			A/R
	521004	16/.2 " " " - RED/BLACK			A/R
	602003	SNAP CONNECTOR	AMP	60983-1	13
	590001	SLEEVE	HELLERMAN	H15 x 20MM LG	8

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS.								

DATE 5.1.76
DRAWN BY IV
CHECK
NEXT DRAWING

datron ELECTRONICS LTD

TITLE 1041 - RATIO AMPL 1v I/P

DRAWING NUMBER 400076

SHEET 4 OF 5

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
	590002	SLEEVE	HELLERMAN	H30-20	1
	605066	6 WAY DIL SOCKET	ASTRALUX	ICY-063-56T.	1
	604006	5 WAY PLUG	PYE	MSP	1
	605007	5 WAY SOCKET	"	MSS	1
	606001/A	LOCKING HOOD (PANEL MT.)	"	MHN	1
	606001/B	LOCKING HOOD (CABLE MT.)	"	MHN	1
	606002	NUT	"	MN	1
	606003	WASHER	"	MLW	1

NOTES.

ISS.								
SEE SHT. 2								

DATE 5.1.76

DRAWN BY IV

CHECK

NEXT DRAWING

datron ELECTRONICS LTD

TITLE 1041 - RATIO AMPL IV I/P

DRAWING NUMBER 400076

SHEET 5 OF 5

J. W. 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R1	063104	100K POT CERMET	BECKMAN	72P	2
R2	063104	100K " "	"	"	-
R3	011003	100K 1% 1/8W M/F	WELWYN	4033C	2
R4	011003	100K " " "	"	"	-
R5	063103	10K POT CERMET	BECKMAN	72P	2
R6	063103	10K " "	"	"	-
R7	050015	100K .25% 1/8W M/F	ERG	EE125	2
R8	050015	100K .25% " "	"	"	-
R9		FSV			1
R10		FSV			1
R11	063205	2M POT CERMET	BECKMAN	72P	1
R12	070087	4K .1% WIREWOUND	MANN	MX125B	1
R13	070067	20K .1% "	"	"	1
R14		NOT USED			-
R15	063203	20K POT CERMET	BECKMAN	72P	1
R16	000474	470K 5% 1/4W CARBON	MULLARD	CR25	1
R17	000101	100R " " "	"	"	1
R18	000822	8K2 " " "	"	"	1
R19		NOT USED			
R20		"			
R21	000103	10K 5% 1/4W CARBON	MULLARD	CR25	3
R22	000103	10K " " "	"	"	-
R23	000272	2K7 " " "	"	"	1

NOTES.

ISS.	1	2 C	3	4	5				
	-	ECO 307	ECO 416	ECO. 692	ECO 760				
	25-8-76	20.10.77	31.3.77	25.5.78	8 Nov 78				

DATE 25.8.76

DRAWN BY M.J.D.

CHECK

NEXT DRAWING

Prod/AD. 2.2.77

datron ELECTRONICS LTD

TITLE 10V/100V RATIO AMP 1041

DRAWING NUMBER 400179

SHEET 2 OF 6

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R24	000182	1K8 5% ¼W CARBON	MULLARD	CR25	1
R25	000103	10K " " "	"	"	-
R26	000824	820K " " "	"	"	1
AN1	090018	THIN FILM NETWORK	ALLEN BRADLEY	FN 207	2
AN2	090018	" " "	" "	"	-
C1	120021	0·47uF 10% 63V POLYCARB.	ASHCROFT	A2B 4711B	2
C2	120021	0·47uF " " "	"	"	-
C3	102102	1nF 500V CER. DISC	ERIE	801	1
C4	120013	·15pF 10% 63V POLYCARB.	ADVANCE	CMD4	1
C5	102330	33pF 500V CER. DISC	ERIE	801	1
C6	101103	10nF 250V " "	"	"	3
C7	101103	10nF " " "	"	"	-
C8	101103	10nF " " "	"	"	-
D1	200008	Si LOW LEAKAGE	FAIRCHILD	IN458A	4
D2	200008	Si " "	"	"	-

NOTES.

ISS.									
SEE SHT 2									

DATE 25-8-76

DRAWN BY M.J.D

CHECK

NEXT DRAWING

datron ELECTRONICS LTD

TITLE 10V/100V RATIO AMP 1041

DRAWING NUMBER 400179

SHEET 3 OF 5

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
D3	200008	Si LOW LEAKAGE	FAIRCHILD	1N458A	-
D4	200008	Si " "	"	"	-
D5	200001	Si G.P.		1N4148	4
D6	200001	Si "		"	-
D7	200001	Si "		"	-
D8	200001	Si "		"	-
Q1	240001	Si NPN G.P.		BC184K	3
Q2	240001	Si " "		"	-
Q3	240001	Si " "		"	-
M1	290014	312 OP. AMP	NATIONAL	LM312H (GREEN/ORANGE)	1
M2	260025	101 " "	"	LM101	1
M3	220005	OPTO ISOLATOR	FAIRCHILD	FCD 820	1
S1	700019	SLIDE SWITCH	SIEMENS	C42315-A60-A1	1
RL1	330003	RELAY 28V 3K2 BIF.	POTTER & BRUMFIELD	R10-E1-L2-S3·2K	1
	602007	RELAY SOCKET	" "	A11-1	1
	630005	CLIP	" "	P28-1	1
	410037-2	P.C.B.			1

NOTES.

ISS.								
SEE SHT. 2								

DATE 25-8-76
DRAWN BY M.J.D.
CHECK
NEXT DRAWING

datron ELECTRONICS LTD

TITLE 10V/100V RATIO AMP. 1041

DRAWING NUMBER 400179

SHEET 4 OF 5

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
	601002	SNAP CONNCETOR	AMP	60803-1	9
	602001	FSV TERMINAL	MOLEX	02-04-1875	4
	620003	SOLDER TERMINAL	HARWIN	H2105A	6
	612006	STANDOFF M3 x 9.5 LG.	"		4
	540002	22 SWG TINNED Cu. WIRE			A/R
	590001	SLEEVE	HELLERMAN	H15-15	A/R
	590002	SLEEVE	"	H30-20	1
	510222	7/-2 P.V.C. INSUL. WIRE - RED			A/R
	510666	" " " " - BLUE			A/R
	510555	" " " " - GREEN			A/R
	510111	" " " " - BROWN			A/R
	510999	" " " " - WHITE			A/R
	510000	" " " " - BLACK			A/R
	590011	SLEEVING BLACK	HELLERMAN	HIS	A/R
	602003	SNAP RECEPTACLE	AMP	609831	15
	510333	7/2 P.V.C. INSUL. WIRE - ORANGE			A/R
	510777	" " " " - VIOLET			A/R
	511001	" " " " - PINK			A/R
	521004	16/-2 " " " - RED/BLACK			A/R

NOTES

ISS.									
SEE SHT 2									

DATE 25-8-76

DRAWN BY M.J.D

CHECK

NEXT DRAWING

datron ELECTRONICS LTD

TITLE 10V/100V RATIO AMP 1041

DRAWING NUMBER 400179

SHEET 3 OF 6

J.W 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
	604006	5 WAY PLUG	PYE	M5P	1
	605007	5 WAY SOCKET	"	M5S	1
	606001/A	LOCKING HOOD (PANEL MT.)	"	MHN	1
	606001/B	LOCKING HOOD (CABLE MT.)	"		1
	606002	NUT	"	MN	1
	606003	WASHER	"	MLW	1
	605066	6WAY D.I.L SOCKET	ASTRALUX	ICY-063-53T	1

NOTES.

ISS.									
SEE SHT 2									

DATE 25-8-76

DRAWN BY M.J.D.

CHECK

NEXT DRAWING

datron ELECTRONICS LTD

TITLE 10V/100V RATIO AMP 1041

DRAWING NUMBER 400179

SHEET 6 OF 6

DRAWING No
400035
FIRST USED ON

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308

PC BOARD 410003-11

M9 TO M14 MOUNTED ON 6 WAY SOCKETS 608516 - 6 OFF

NYLON WASHER 613011

TOTAL N° OF WASHERS 14 & THEIR POSITIONS

M1 M2 M3 & M5 MOUNTED ON 16 WAY DIL SOCKETS 608518 - 4 OFF

M3 M4 M6 & M7 MOUNTED ON 14 WAY DIL SOCKETS 608517 - 4 OFF

SHROUD 630026
(NUT & WASHER NOT FITTED)

RELAY WIRING (RED 510222)

WIRE TO PIN A 30mm
B 45mm
D 65mm
C 60mm

WIRE LINK TO PCB 540002 15mm

VIEW IN DIRECTION OF ARROW 'A'

VP CABLE ASSY 400064

6 OFF M3 x 22mm STANDOFF 612005

5 OFF P.T.F.E STANDOFF 620002

WIRE 65mm, RED 510222

2 OFF SLEEVES (Ref. 660001)

30cm RED (510227)

DRAWN W.G. SMITH.	CHECKED MJD	DIMENSIONS IN MILLIMETRES	TOLERANCES INCH DIMENSIONS DECIMAL TO 3 PLACES ± DECIMAL TO 2 PLACES ± FRACTIONAL METRIC DIMENSIONS DECIMAL TO 2 PLACES ± DECIMAL TO 1 PLACE ± WHOLE DIMENSIONS UNLESS OTHERWISE STATED
TRACED	APPROVED	SCALE NOT TO BE SCALED	
DATE 13-NOVEMBER 78	DATE 13 NOVEMBER 78		

ALL WORK

NOTES

CHANGES

TEST POINT LOOPS
24 SWG BTC WIRE
540001

SLEEVED WIRE LINK

5 OFF SLEEVED LINKS
(540002 / 540004)

J1 & J2 FIT TO UNDERSIDE OF P.C.B.

12 OFF CONNECTOR
601002

NOTES:

1. SLEEVE ALL IN4588's WITH 590004
2. FIT UPPER GUARD SHIELD (450009) WITH 6 OFF POSI CSK SCREWS M3 x 6 (611007). FIT LOWER GUARD SHIELD (450010) WITH 6 OFF POSI PAN SCREWS M3 x 10 (611009) AND 6 OFF SHAKEPROOF (613005)

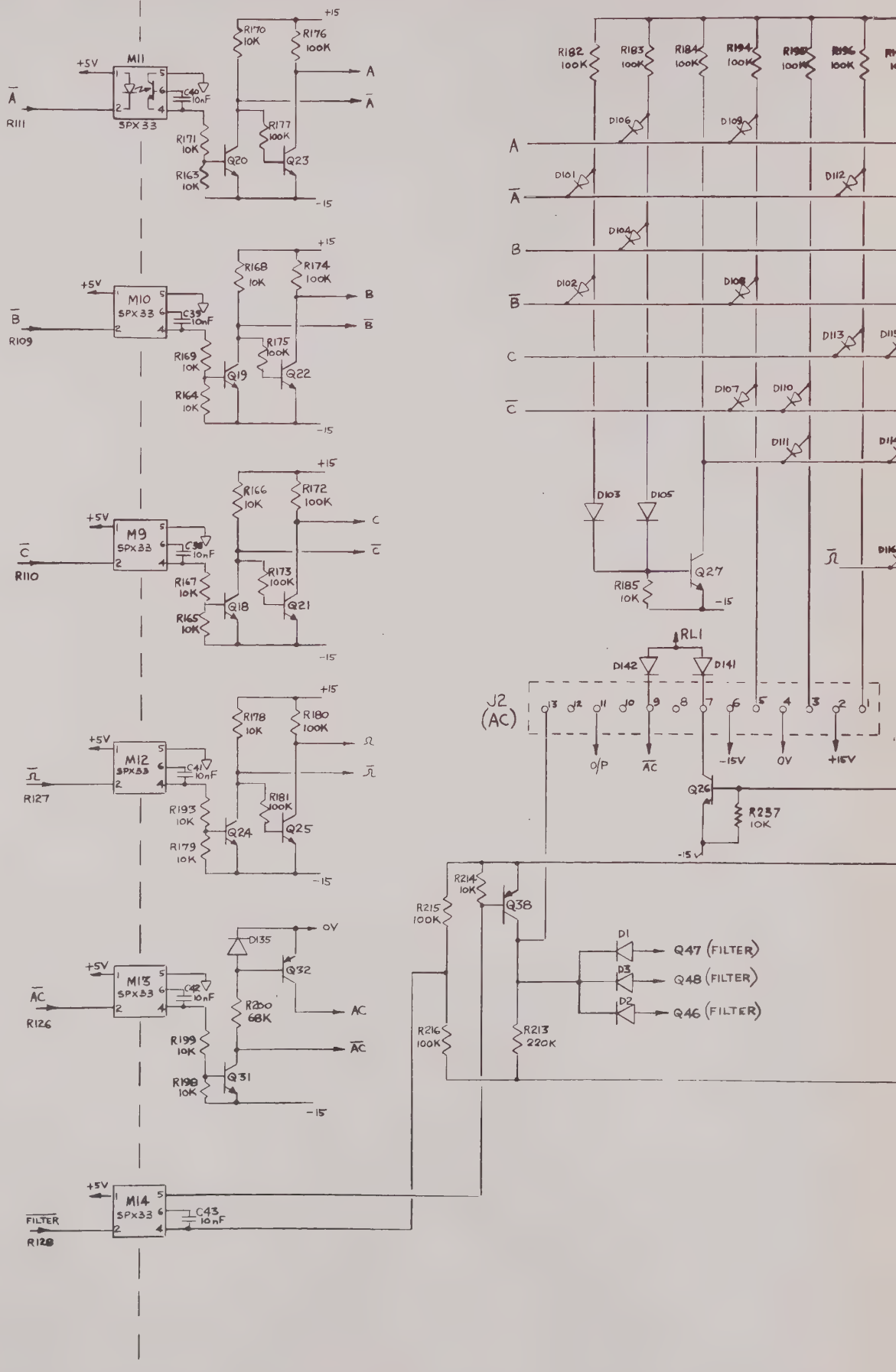
4 OFF
INSULATING BEAD 630036

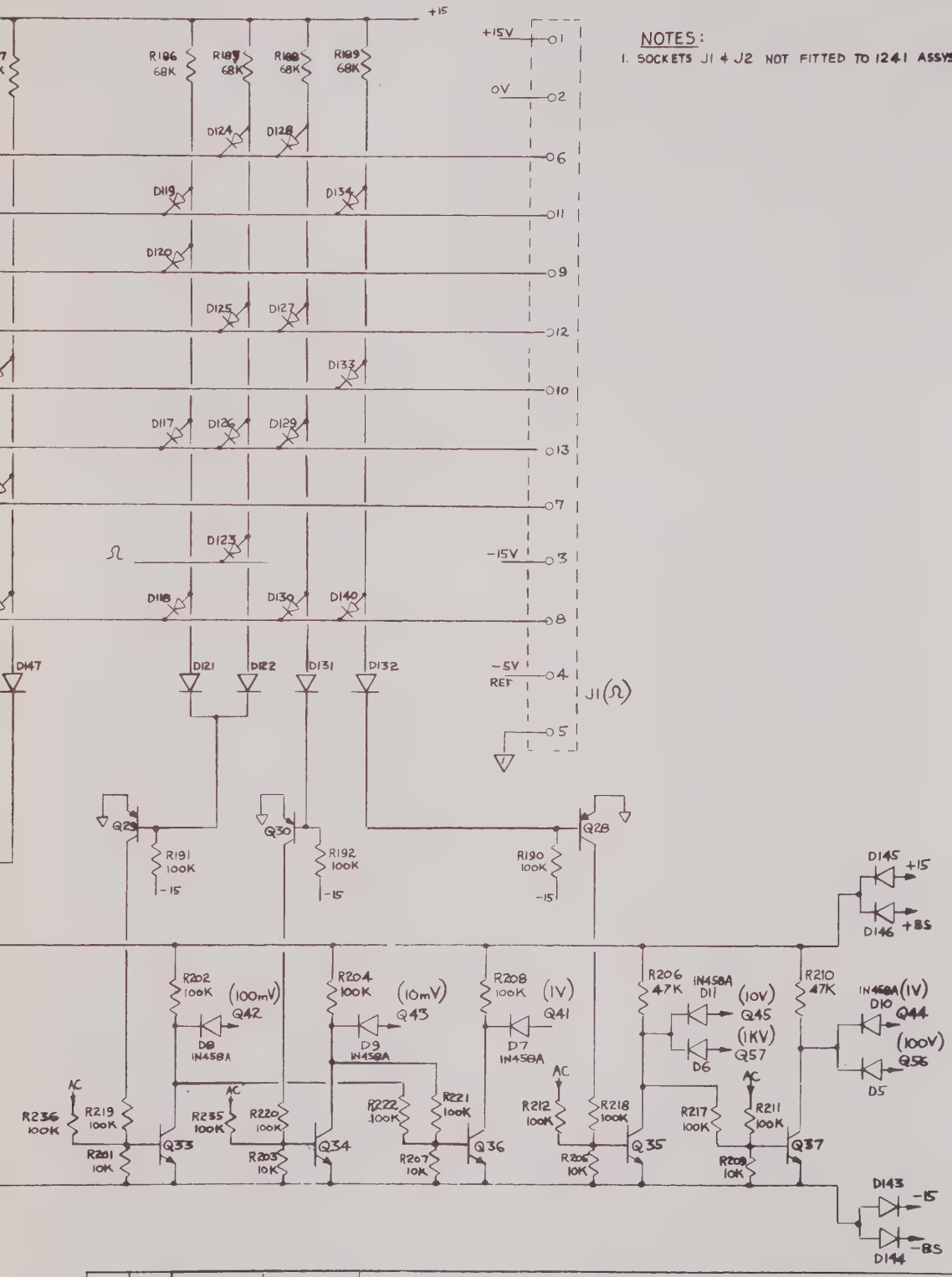
RESISTORS STUCK TOGETHER WITH 1512

10 OFF
TERMINAL RIVET
620003

6 OFF
FSV TERMINAL
602001

ANGULAR ± ° 005 010 1/64 1mm 2mm 4mm	MATERIAL	datron ELECTRONICS LTD. NORWICH.		DRAWING SIZE A1
	FINISH	TITLE 1041 DC ISOLATOR	DRAWING No 400035	SHEET 1 of 25


M11
SPX33
R111
R170 10K
R176 100K
R171 10K
R177 100K
R163 10K
Q20
Q23
C40 10nF
+15
-15
+5V
A
$\bar{A}$
M10
SPX33
R109
R168 10K
R174 100K
R169 10K
R175 100K
R164 10K
Q19
Q22
C39 10nF
B
$\bar{B}$
M9
SPX33
R110
R166 10K
R172 100K
R167 10K
R173 100K
R165 10K
Q18
Q21
C38 10nF
C
$\bar{C}$
M12
SPX33
R127
R178 10K
R180 100K
R193 10K
R181 100K
R179 10K
Q24
Q25
C41 10nF
Ω
$\bar{\Omega}$
M13
SPX33
R126
D135
0V
R200 68K
R199 10K
R198 10K
Q31
Q32
C42 10nF
AC
$\bar{AC}$
M14
SPX33
FILTER
R128
C43 10nF
R182 100K
R183 100K
R184 100K
D106
D109
D101
D112
D104
D102
D108
D113
D107
D110
D111
D103
D105
Q27
R185 10K
RL1
D142
D141
J2 (AC)
O/P
$\bar{AC}$
-15V
0V
+15V
Q26
R237 10K
R214 10K
R215 100K
R216 100K
R213 220K
Q38
D1
D3
D2
Q47 (FILTER)
Q48 (FILTER)
Q46 (FILTER)



NOTES:
1. SOCKETS J1 & J2 NOT FITTED TO 1241 ASSYS.

REV	DATE	REVISION	DATE
10 (SHT. 2)	ECO 464 23/3/77		24-6-74
11 (SHT. 8)	ECO 500 27.9.77		
12	ECO 488 20.5.77	2	13/5/75 ECO. 49
15			
		3	22/10/75 ECO. 118
	9 (SHT 2)		ECO 466 27-4-77

datron ELECTRONICS LTD

R&D

CHECK D R Duke

PROD. L.A.D. 2.2.77

1041 / 1241 D.C. ISOLATOR
RANGE DECODING

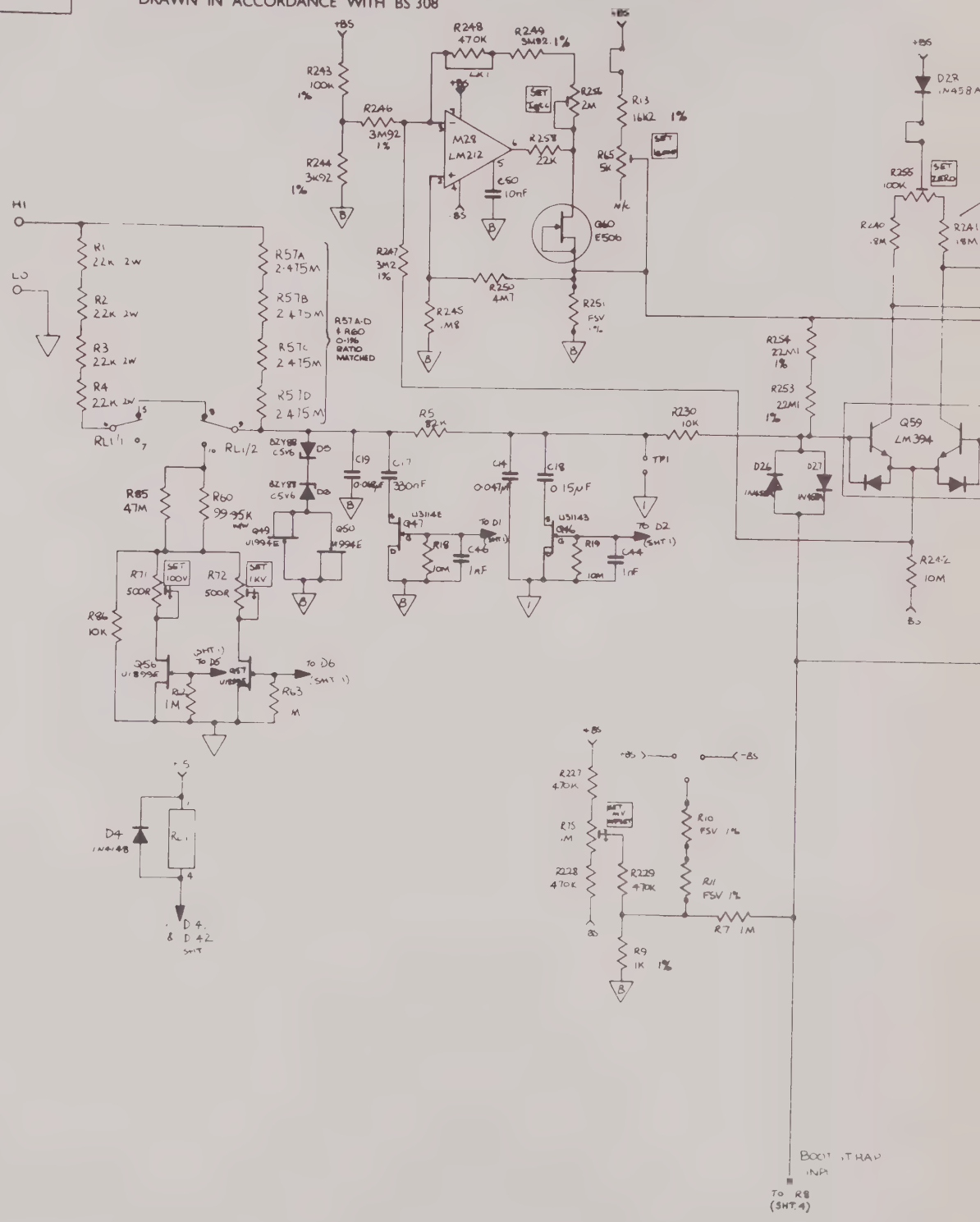
430010

SHEET 1 OF 4

DRAWING No.
430010
FIRST USED ON

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN MH	CHECKED MD M.L.B	DIMENSIONS IN MILLIMETRES	TOLERANCES ANGULAR INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64 METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ± 4mm UNLESS OTHERWISE STATED
TRACED	APPROVED	SCALE NOT TO BE SCALED	
DATE 19 10 78	DATE		

JW 116

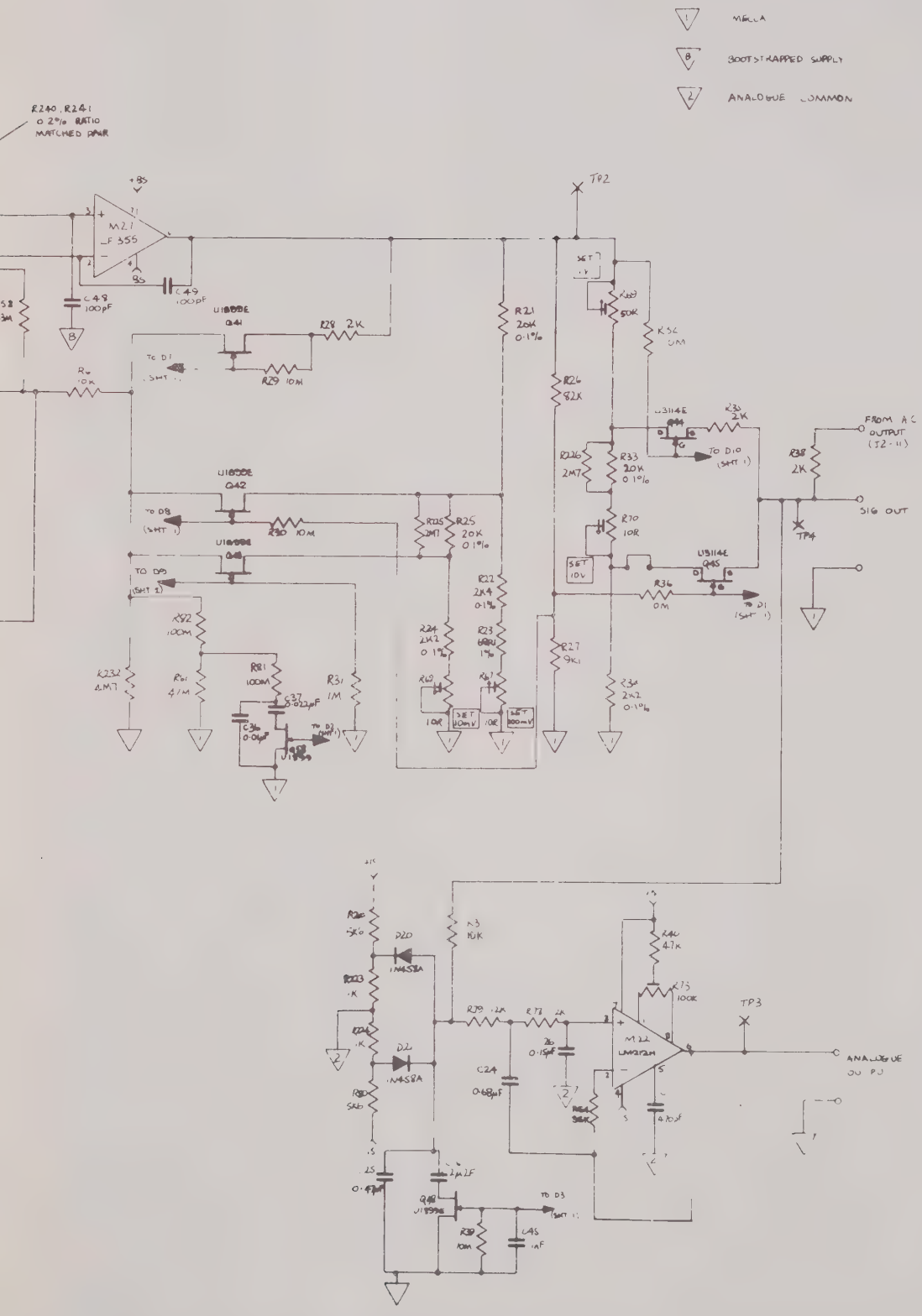
5	6	7

ALL BURRS TO BE REMOVED

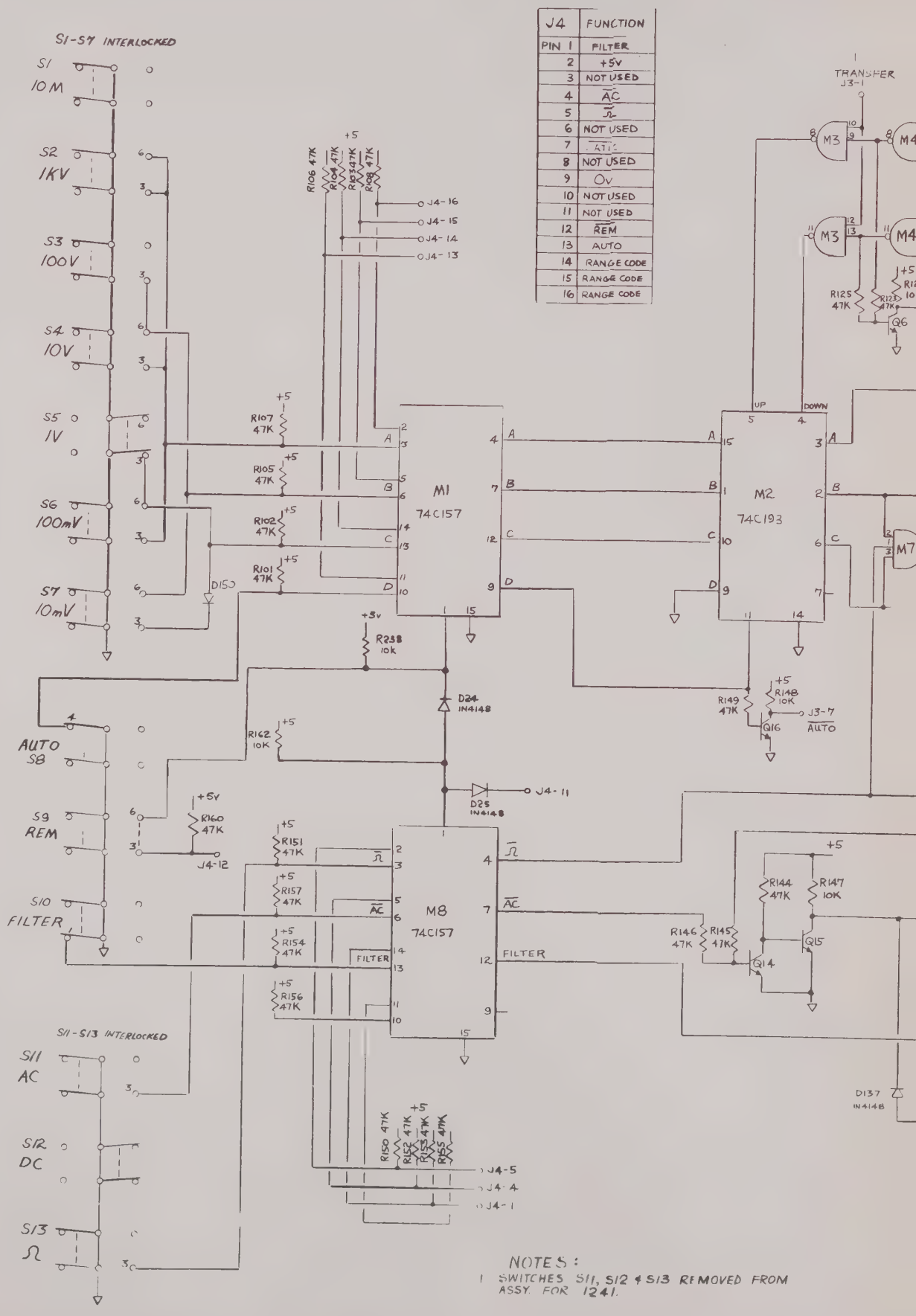
NOTES

1 ALL RESISTORS 5% ¼W CARBON UNLESS OTHERWISE STATED

ISS.	CHANGES
13	REDRAWN ECO 757, 758, 788 30-10-78

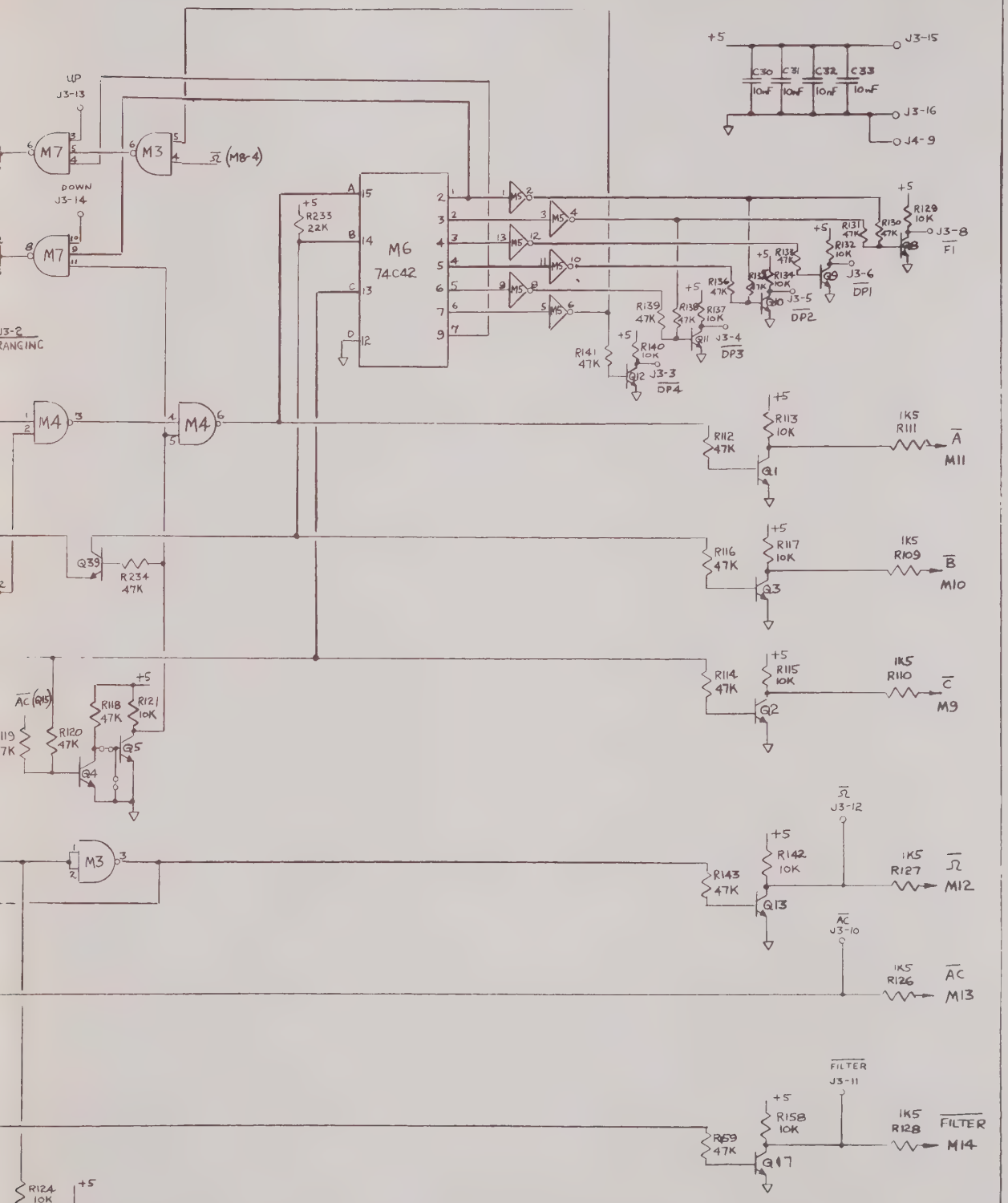


MATERIAL	datron ELECTRONICS LTD. NORWICH.		DRAWING SIZE A1
FINISH	TITLE 1041 D.C. ISOLATOR - ANALOGUE	DRAWING No. 430010	SHEET 2 of 4



NOTES:

1 SWITCHES S11, S12 & S13 REMOVED FROM ASSY. FOR 1241.



REV.	DATE	REVISION	DATE
11	27.9.77 ECO 546		28-6-74
12	30.3.78 ECO. 650 SHT 1	2	28.1.76 ECO.134
13	ECO 757 788 756 SHTS 2&4	9	SEE SHT 1
31-10-78		10	23 9 77 ECO. 561 (SHT 2)

datron ELECTRONICS LTD

R&D

CHECK D

PROD L.A.D. 2.2.77

1041 / 1241 D.C. ISOLATOR.

RANGE LOGIC

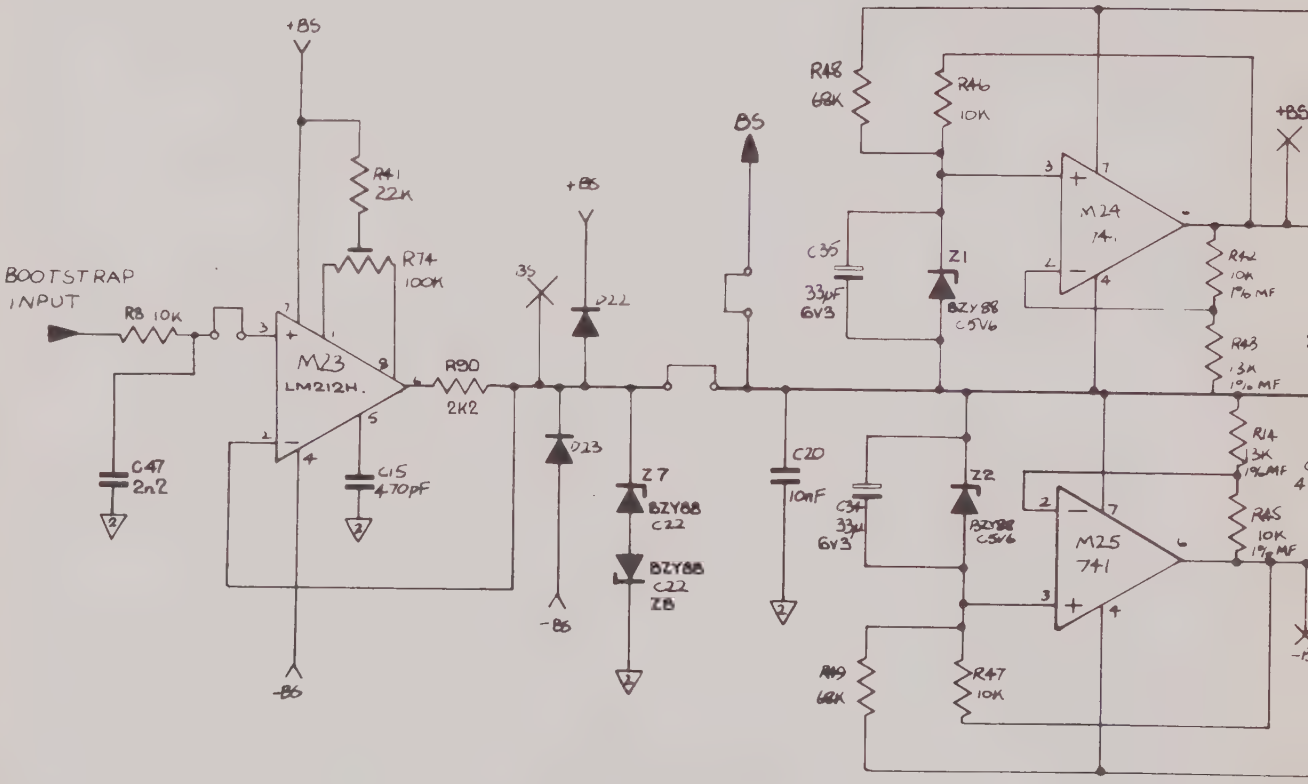
430010

SHEET 3 OF 4

DRAWING No.	
430010	
FIRST USED ON	

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	MATERIAL
MGH.	MD M.J.T.B.	MILLIMETRES	ANGULAR ± ½°	
TRACED	APPROVED	SCALE	INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64 METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm	FINISH
DATE 20-12-78	DATE	NOT TO BE SCALED	UNLESS OTHERWISE STATED	

4 | 5 | 6

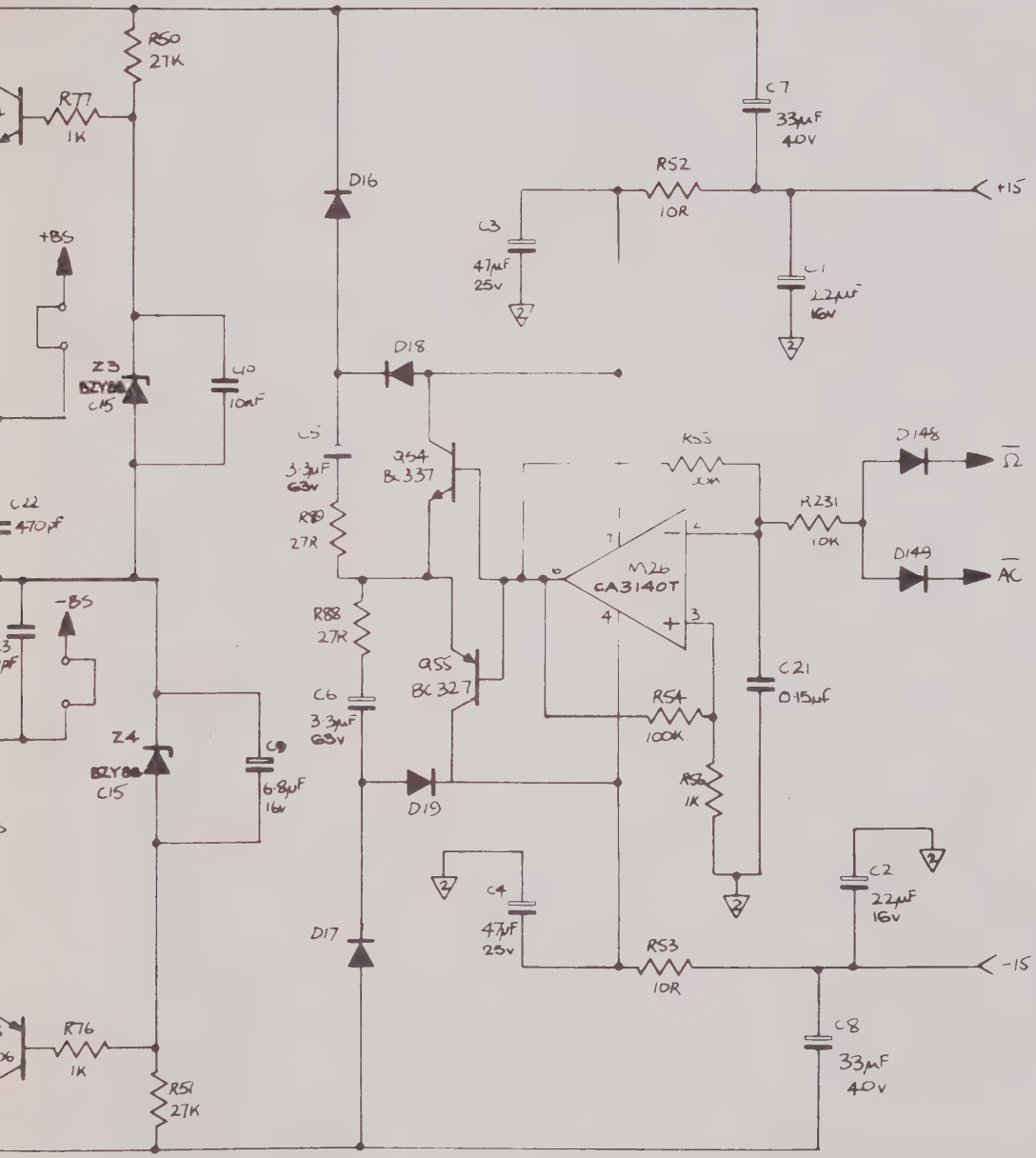
L BURRS TO BE REMOVED

NOTES

1 ALL RESISTORS 5% 1/4W CARBON UNLESS OTHERWISE STATED.

2 ALL DIODES IN4148 UNLESS OTHERWISE STATED.

13 REVISION ECO 787, 788, 786 31-10-78



datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE 1041 DC. ISOLATOR - BOOTSTRAP

DRAWING No. 430010

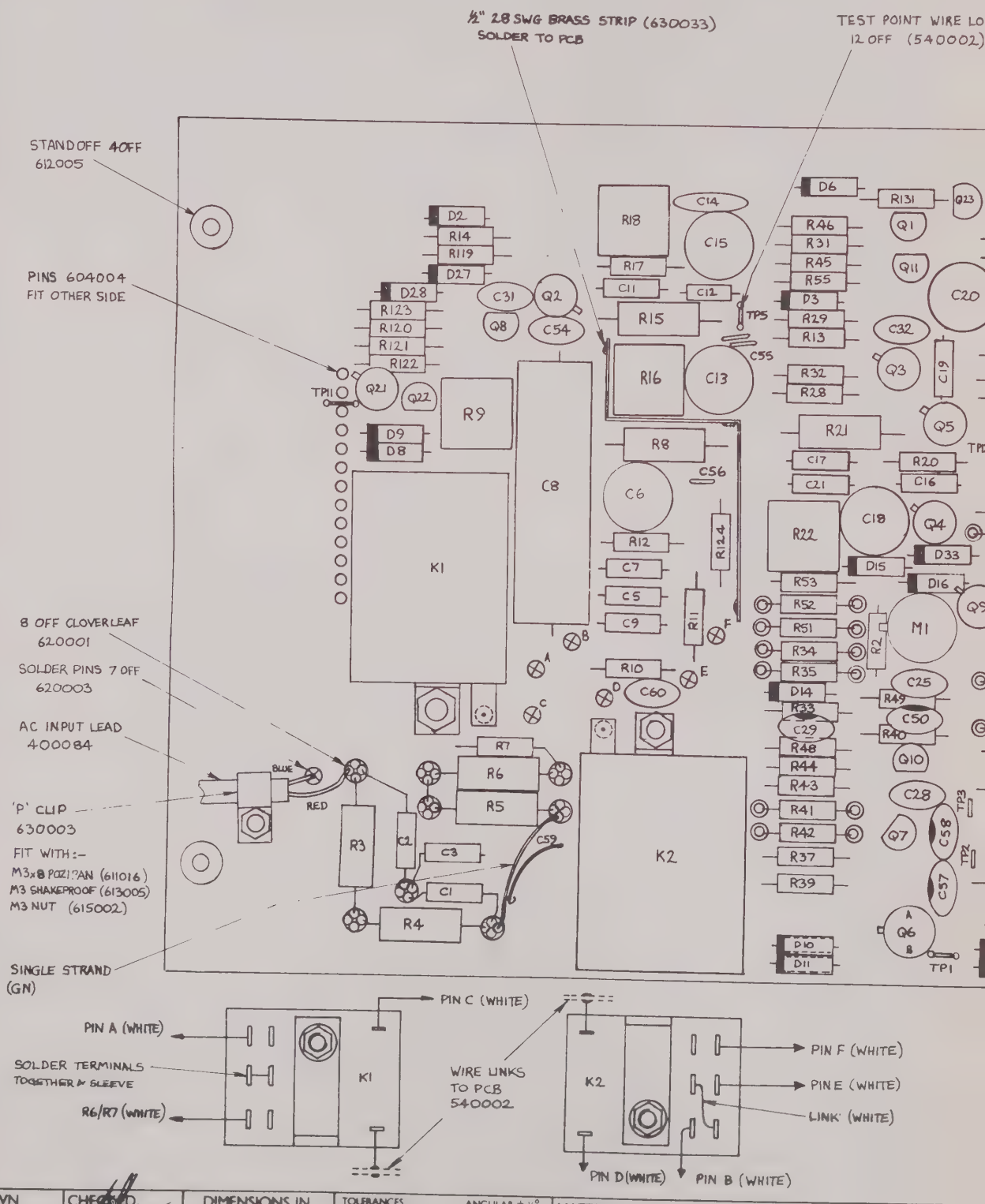
SHEET

DRAWING No. 400037

FIRST USED ON 1041

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN BH	CHECKED	DIMENSIONS IN MILLIMETRES	TOLERANCES ANGULAR ± ½° INCH DIMENSIONS: DECIMAL TO 3 PLACES ± .005; DECIMAL TO 2 PLACES ± .010; FRACTIONAL ± 1/64. METRIC DIMENSIONS: DECIMAL TO 2 PLACES ± 1mm; DECIMAL TO 1 PLACE ± 2mm; WHOLE DIMENSIONS ± 4mm. UNLESS OTHERWISE STATED	MATERIAL
TRACED	APPROVED	SCALE NOT TO BE SCALED		FINISH
DATE 5.A.77	DATE 7.4.77			

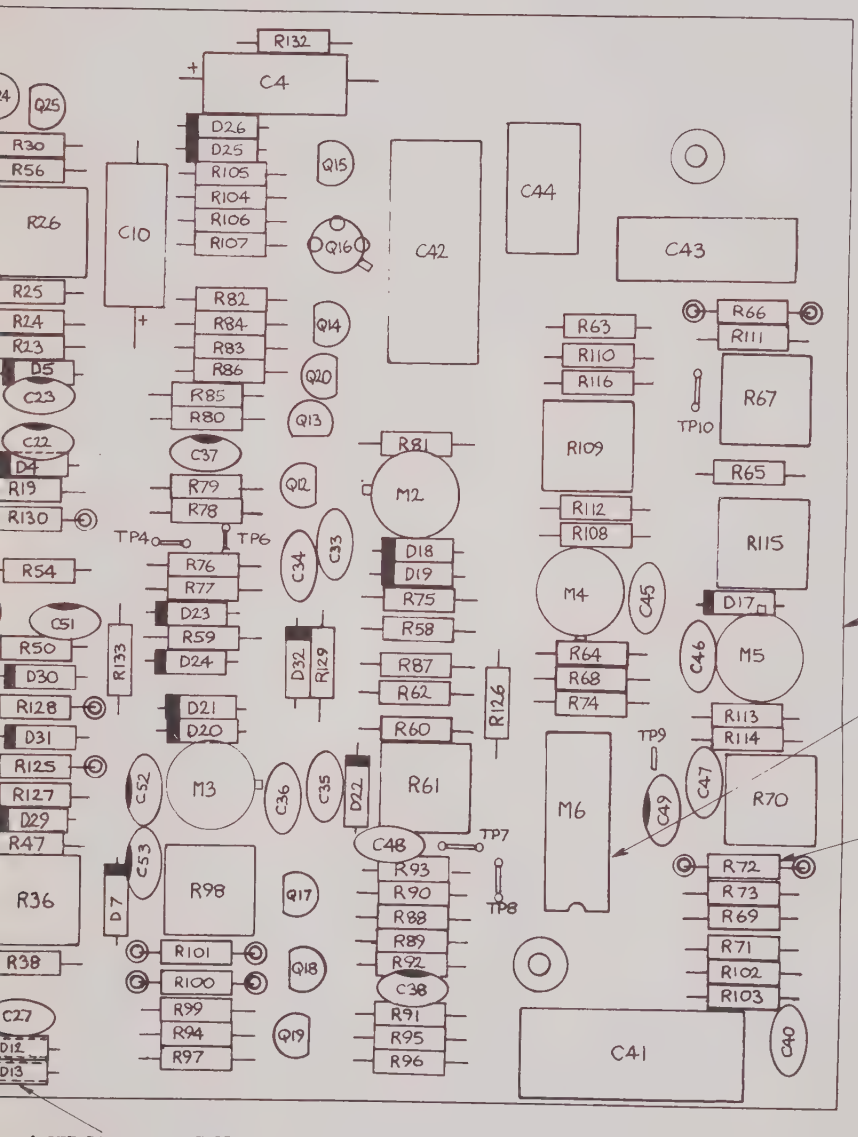
4 | 5 | 6

ALL BURRS TO BE REMOVED

NOTES

1. FIT GUARD SHIELD (450012) WITH 4 OFF M3x8 POZIPAN SCREW (611016) 4 OFF SHAKE PROOF M3 (613005)
2. RELAY WIRING: ALL UNSTRIPPED WIRE LENGTHS ± 50mm (510999) ALL WIRE TERMINATIONS TO BE SLEEVED (590001)
3. C55, 56 & 59 SLEEVED WIRE 13·0mm LONG HOOK ENDS TO RETAIN SLEEVE (540002/590004)
4. THE FOLLOWING DIODES ARE TO BE SLEEVED WITH BLACK SLEEVES (590001) . D10 & D11. D29 TO D32 (4 OFF).

ISS.	CHANGES
19	REDRAWN TO INCLUDE ECO 423 5-4-77 PJH
20	ECO. 542 26.9.77 PT. LTS. CHANGES. IL
21	ECO. 695. 30.5.78 PARTS LIST MODS. IL
22	ECO. 669. 1.6.78 SUPP: GUARD SHIELD 450152 DELETED IL.
23	E.C.O. 743 6-11-78 PARTS LIST MOD WGB



PCB 410006-4

FIT SOCKET STRIP 602004 16 OFF SOLDER M6 INTO SOCKETS AFTER TEST.

FIT ON ASSY DO NOT SOLDER

4 OFF DIODES SLEEVED BLACK SLEEVING 590011

FIT RELAYS K1, K2 WITH :-

RELAY BRACKET	(459112)	2 OFF
M3x8 POZIPAN	(611016)	2 OFF
M3 SHAKEPROOF	(613005)	2 OFF
M3 NUT	(615002)	2 OFF

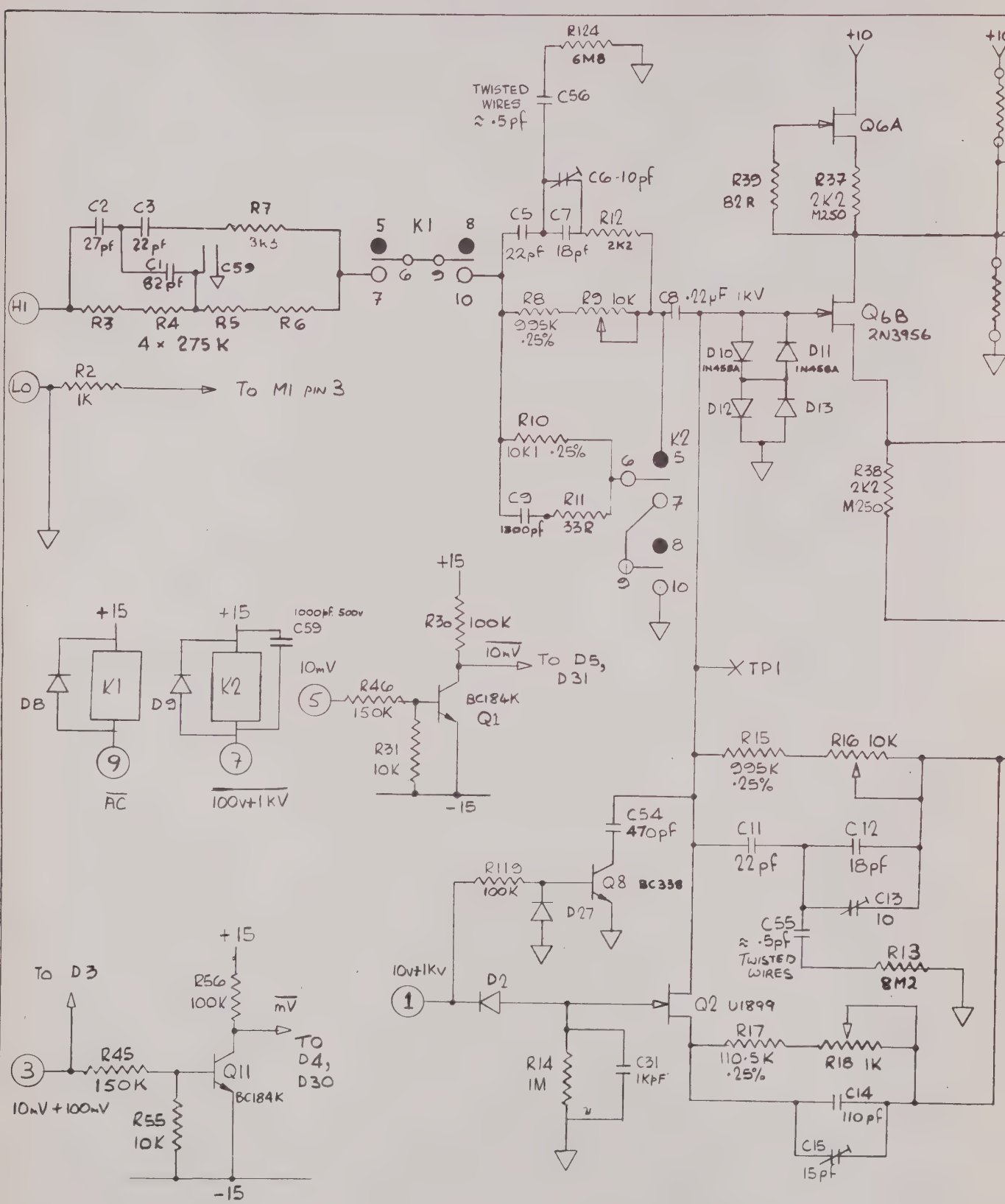
datron ELECTRONICS LTD. NORWICH.

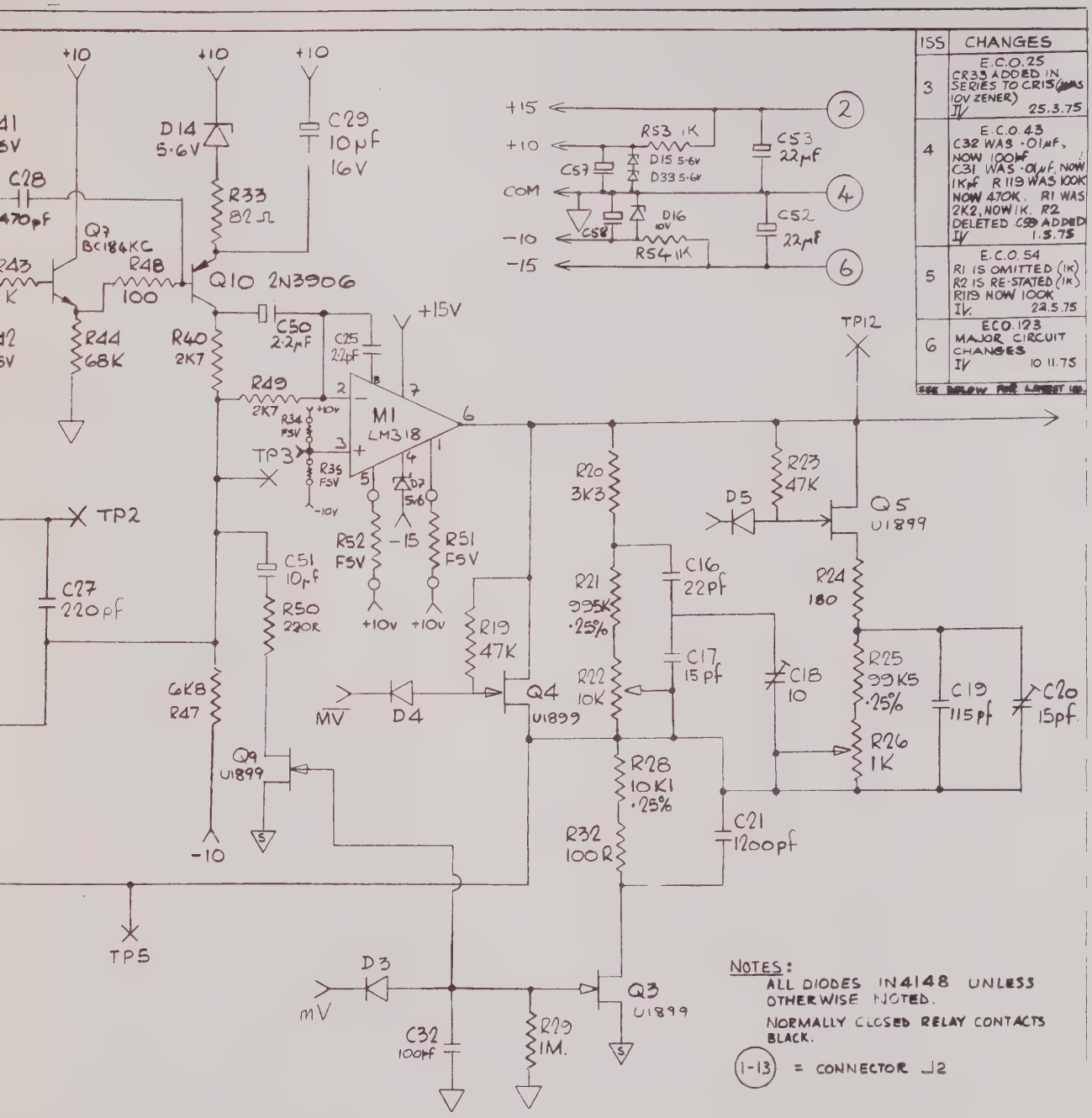
DRAWING SIZE A2

TITLE: AC OPTION 01 ASSEMBLY

DRAWING No. 400037

SHEET 1 OF 13


R124
6M8
TWISTED WIRES ≈ ·5pf
C56
C6 10pf
+10
Q6A
R39 82R
R37 2K2 M250
C2 27pf
C3 22pf
R7 3k3
C1 82pf
C59
H1
R3
R4
R5
R6
4 × 275 K
5 K1 8
7 6 9 10
C5 22pf
C7 18pf
R12 2K2
R8 995K ·25%
R9 10K
C8 ·22pF 1KV
Q6B 2N3956
D10 IN458A
D11 IN458A
D12
D13
LO
R2 1K
To M1 pin 3
R10 10K1 ·25%
C9 1300pf
R11 33R
K2
R38 2K2 M250
+15
1000pf 500v C59
R30 100K
10mV
To D5, D31
TP1
D8
K1
D9
K2
9
7
AC
100v+1KV
R46 150K
BC184K Q1
R31 10K
-15
R15 995K ·25%
R16 10K
C54 470pf
C11 22pf
C12 18pf
R119 100K
Q8 BC338
D27
C13 10
C55 ≈ ·5pf TWISTED WIRES
R13 8M2
To D3
R56 100K
mV
TO D4, D30
10v+1KV
D2
Q2 U1899
R17 110·5K ·25%
R18 1K
R45 150K
Q11 BC184K
10mV + 100mV
R55 10K
R14 1M
C31 1KpF
C14 110pf
C15 15pf



ISS	CHANGES
3	E.C.O.25 CR33 ADDED IN SERIES TO CR15 (WAS 10V ZENER) IV 25.3.75
4	E.C.O.43 C32 WAS ·01μF, NOW 100pF C31 WAS ·01μF, NOW 1Kpf R119 WAS 100K NOW 470K. R1 WAS 2K2, NOW 1K. R2 DELETED. C59 ADDED IV 1.5.75
5	E.C.O.54 R1 IS OMITTED (1K) R2 IS RE-STATED (1K) R119 NOW 100K IV. 22.5.75
6	ECO.123 MAJOR CIRCUIT CHANGES IV 10.11.75

SEE BELOW FOR LATEST ISS

NOTES:
ALL DIODES IN4148 UNLESS OTHERWISE NOTED.
NORMALLY CLOSED RELAY CONTACTS BLACK.
(1-13) = CONNECTOR J2

REVISION	DATE
11	ECO 542 27.9.77
12	ECO.695 30.5.78

REVISION	DATE
3	ECO. 25 25/3/75
4	ECO.43 1.5.75
5	ECO 54 22.5.75
6	ECO 123 10/11/75
7	ECO 143 21/1/76
8	ECO 200 14-4-76
9	ECO 220 24.6.76
10	ECO 423 6.4.77 SHT 1&2

datron ELECTRONICS LTD

R&D

CHECK

PROD. A.D 2.2.77

NEXT DRG 400037

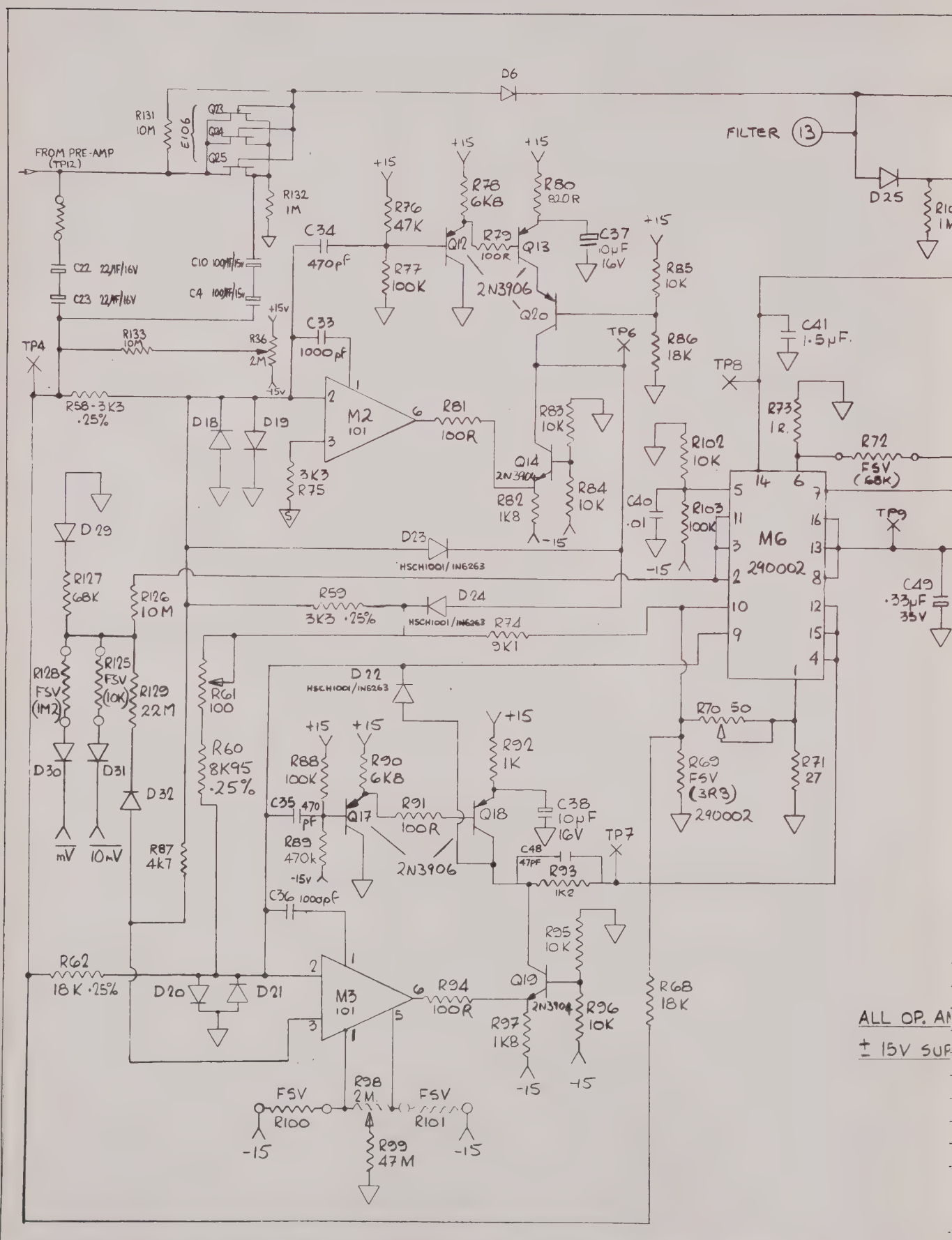
TITLE.

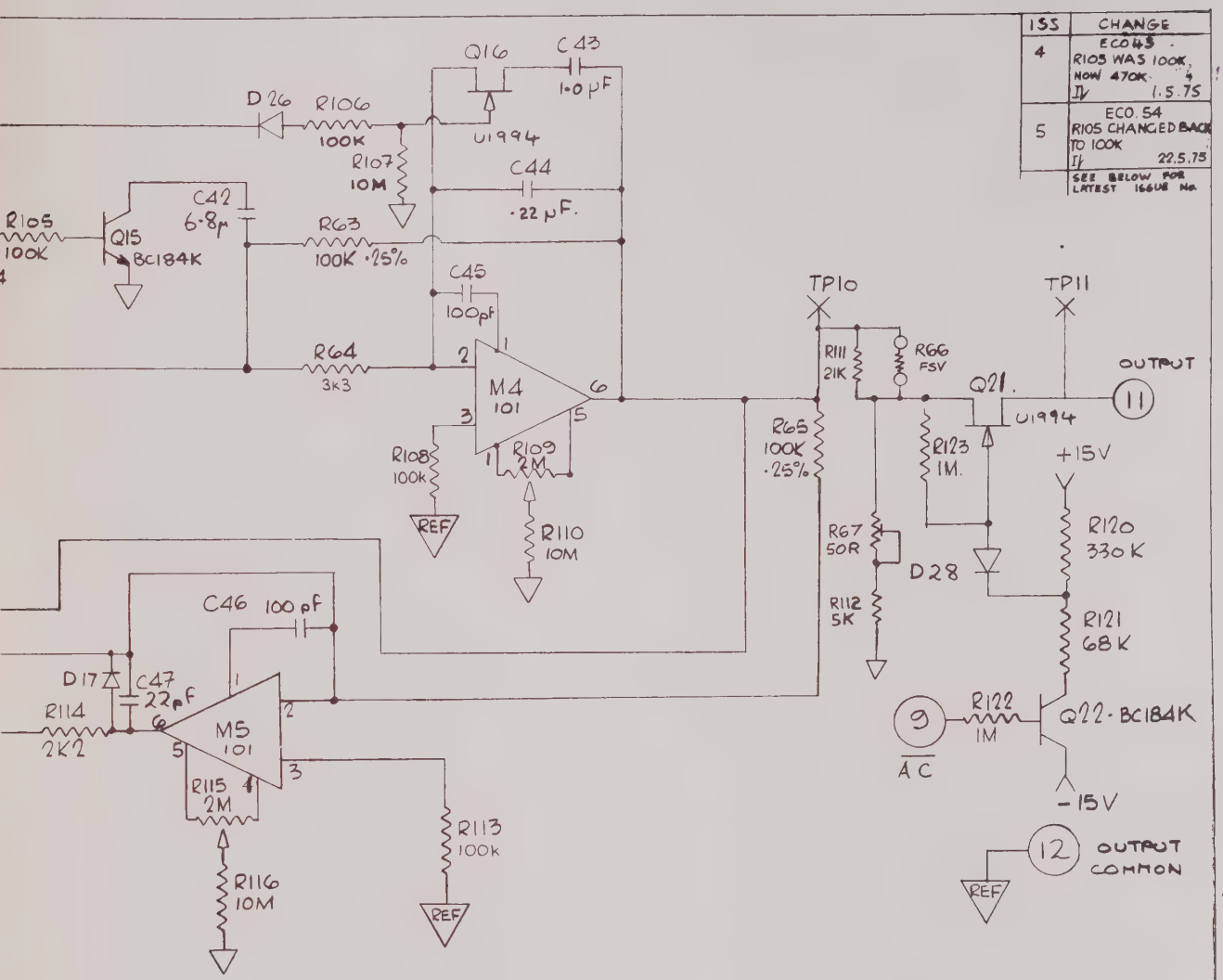
1041/1051

AC PREAMP

DRG Nº 430016.

SHEET 1 OF 2


D6
FILTER 13
D25
FROM PRE-AMP (TP12)
R131 10M
E106
Q23
Q24
Q25
R132 1M
C22 22μF/16V
C23 22μF/16V
C10 100pF/15V
C4 100pF/15V
+15v
R133 10M
R36 2M
C33 1000pF
TP4
R58 3K3 .25%
D18
D19
M2 101
R81 100R
3K3 R75
C34 470pF
R76 47K
R77 100K
+15
R78 6K8
R80 820R
Q12
R79 100R
Q13
2N3906
Q20
C37 10μF 16V
R85 10K
R86 18K
TP6
C41 1.5μF.
TP8
R73 1R.
R72 FSV (68K)
R83 10K
Q14 2N3904
R82 1K8
R84 10K
-15
R102 10K
C40 .01
R103 100K
M6 290002
TP9
C49 .33μF 35V
D23 HSCH1001/IN6263
D24 HSCH1001/IN6263
R59 3K3 .25%
R74 9K1
D29
R127 68K
R126 10M
R128 FSV (1M2)
R125 FSV (10K)
R129 22M
D30
D31
D32
mV
10mV
R87 4k7
R61 100
R60 8K95 .25%
D22 HSCH1001/IN6263
R88 100K
R90 6K8
R92 1K
C35 470pF
Q17
R91 100R
Q18
C38 10pF 16V
R89 470k
C48 47pF
R93 1K2
TP7
C36 1000pF
R70 50
R69 FSV (3R3)
R71 27
290002
R62 18K .25%
D20
D21
M3 101
R94 100R
Q19
2N3904
R95 10K
R96 10K
R97 1K8
R68 18K
R98 2M
FSV R100
FSV R101
R99 47M
ALL OP. AM
± 15V SUP



ISS	CHANGE
4	ECO 43 · R105 WAS 100K, NOW 470K · IP 1.5.75
5	ECO. 54 R105 CHANGED BACK TO 100K IP 22.5.75

SEE BELOW FOR LATEST ISSUE No.

APS TO
PLY.

		REVISION	DATE
10	SEE SHT 1	2	27.10.74
11	27.9.77 ECO 542	3	—
12	30.5.78 ECO.695	4	1.5.75 ECO.43
		5	22.5.75 ECO. 54
		6	10.11.75 Eco 123
		7	21.1.76 ECO. 143
		8	14.4.76 ECO 200
		9	24.6.76 ECO 220

datron ELECTRONICS LTD.

DRD

CHECK

PROD L.A.D. 2.2.77

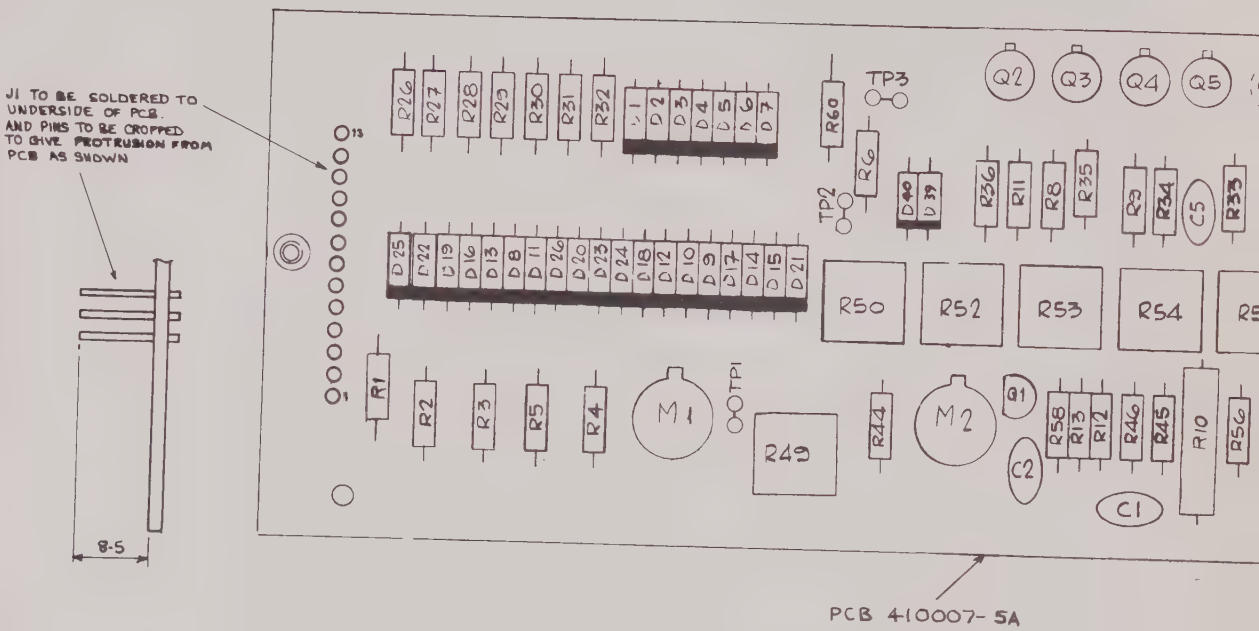
NEXT DRG 400037

TITLE. AC RMS

1041/1051

DRAWING N° 430016

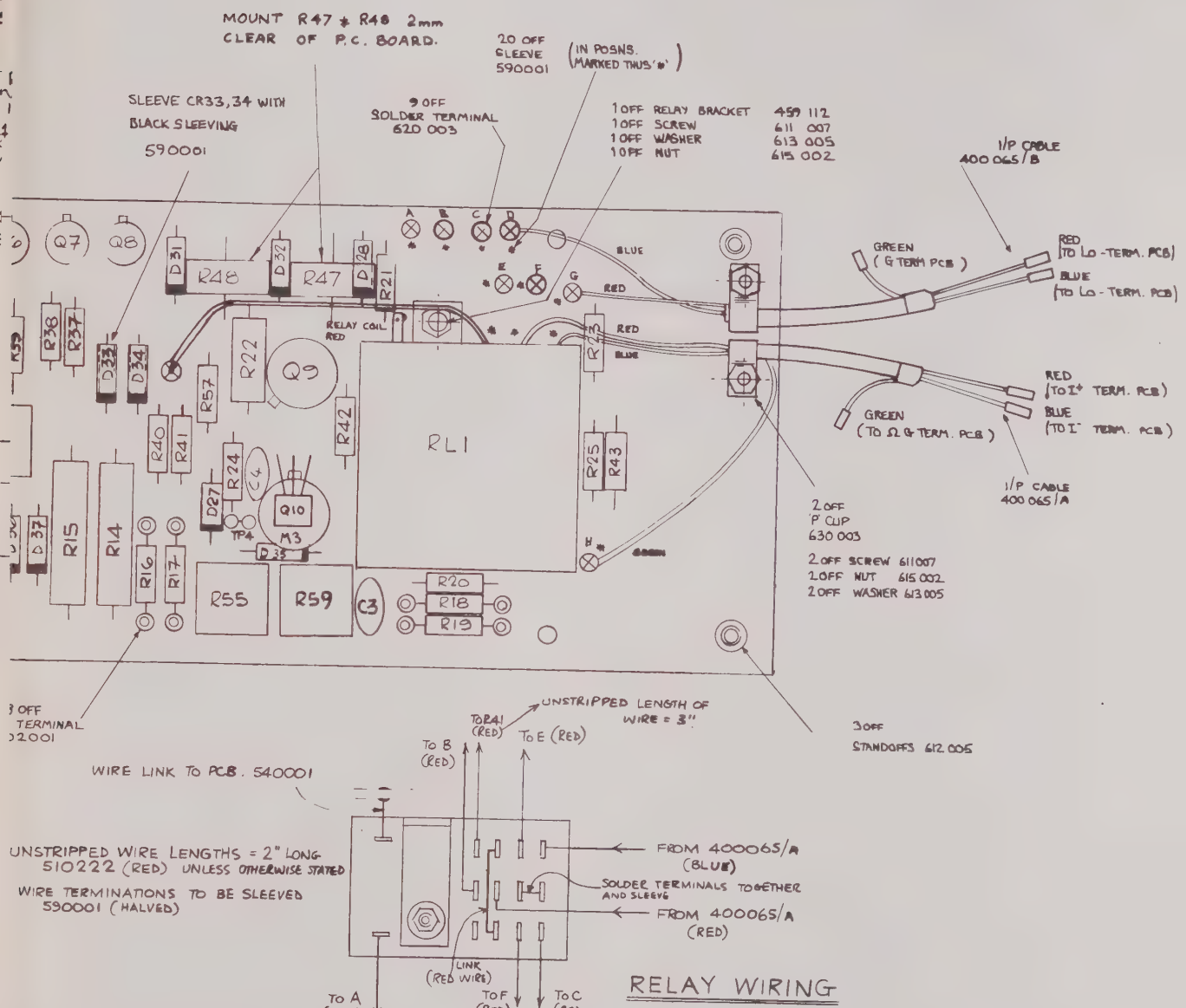
SHEET 2 OF 2



NOTES:

1. TEST POINT LOOPS (T.P'S) MADE FROM 24 SWG. B.T.C. WIRE (54-0001) CUT AS REQD.
2. Q10 AND M3 STUCK TOGETHER WITH CYANOCRYLATE. BY CHECKOUT
3. FIT GUARD SHIELD (45011) WITH 3OFF SCREW POSIPAN M3x6 (611004) AND 3OFF SHAKEPROOF (613005)
4. THE FOLLOWING DIODES TO BE SLEEVED WITH BLACK SLEEVES (350001) D1-D7 D27 & D35. D40 (10 OFF). ½ SLEEVE 10"/M PER DIODE.

PIN REF	LEAD DESTINATION	WIRE COLOUR	
A	RELAY COIL PIN 1	RED	
B (I+)	" COMMON " 12	RED	
C (I-)	" N/O " 10	RED	
D	LO (TERM PCB)	BLUE	
E	RELAY N/C PIN 14	RED	
F	" N/C " 8	RED	
G	LO (TERM. PCB)	RED	
H	ΩG (" ")	GREEN	
R41	RELAY N/C PIN 11	RED	



UNSTRIPPED LENGTH OF WIRE = 3"
TO R4! (RED)
TO E (RED)
TO B (RED)
WIRE LINK TO PCB. 540001
UNSTRIPPED WIRE LENGTHS = 2" LONG 510222 (RED) UNLESS OTHERWISE STATED
WIRE TERMINATIONS TO BE SLEEVED 590001 (HALVED)
FROM 400065/A (BLUE)
SOLDER TERMINALS TOGETHER AND SLEEVE
FROM 400065/A (RED)
LINK (RED WIRE)
TO A (RED)
TO F (RED)
TO C (RED)

RELAY WIRING

REVISION	DATE	REVISION	DATE	REVISION	DATE
14 ND	25-8-78 P/L CHANGE	6	3.3.76. ECO.180	A (TOL)	19/9/74
		7	6.5.76. ECO. 206		
		8	1.9.76 ECO 273	B	21/4/75 ECO 35
		9	31.3.77 ECO. 414		
		10	19.9.77 ECO 519	4	10/9/75 ECO 102
		11	13.3.78 ECO 633		
		12	14-8-78. ECO. 602	5	28/1/76 ECO. 138
		13	15.3.78 ECO. 658		

datron ELECTRONICS LTD

R & D 19.9.76

CHECK

PROD L.A.D. 22.7.77

NEXT DRG

TITLE

1041 Ω CARD: PCB ASSEMBLY

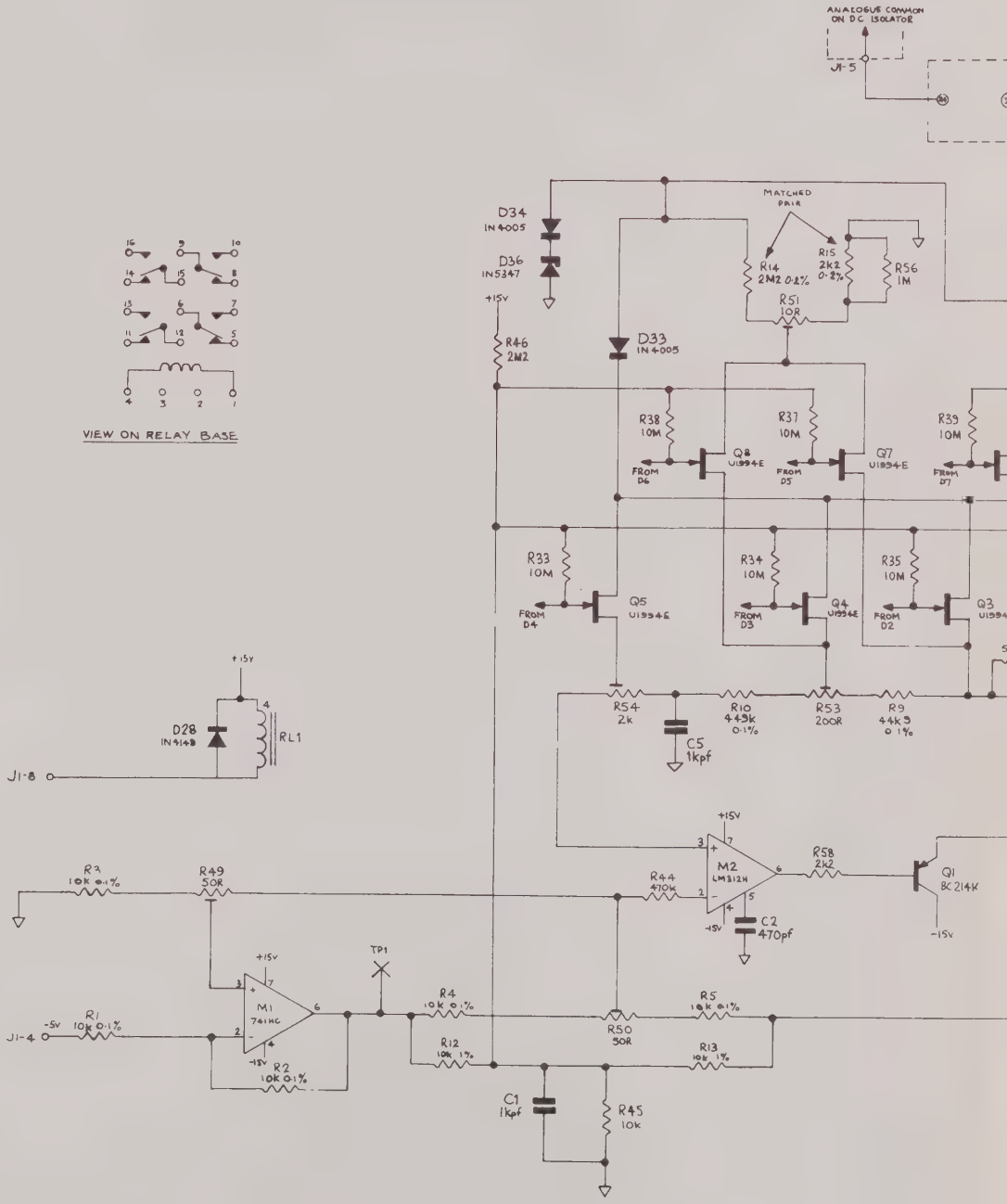
DRAWING Nº 400036

SHEET 1 OF 5

DRAWING No. 430008
FIRST USED ON 1041

THIRD ANGLE PROJECTION
DRAWN IN ACCORDANCE WITH BS 308

VIEW ON RELAY BASE



DRAWN kss	CHECKED	DIMENSIONS IN	TOLERANCES ANGULAR °
TRACED	APPROVED	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64
DATE 8·2·78	DATE	SCALE NOT TO BE SCALED	METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ± 4mm UNLESS OTHERWISE STATED

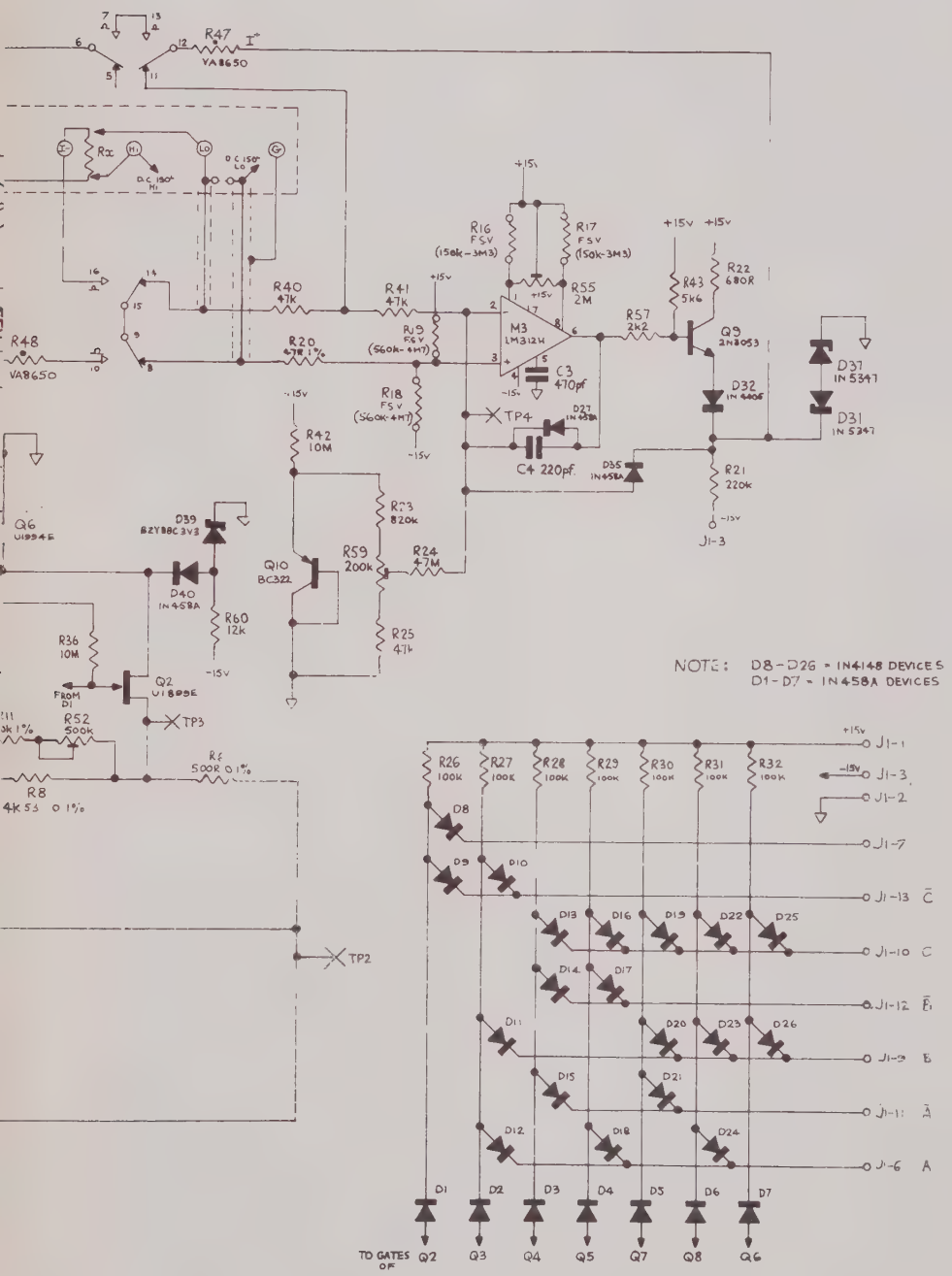
IW 116

5	6	7

ALL BURRS TO BE REMOVED

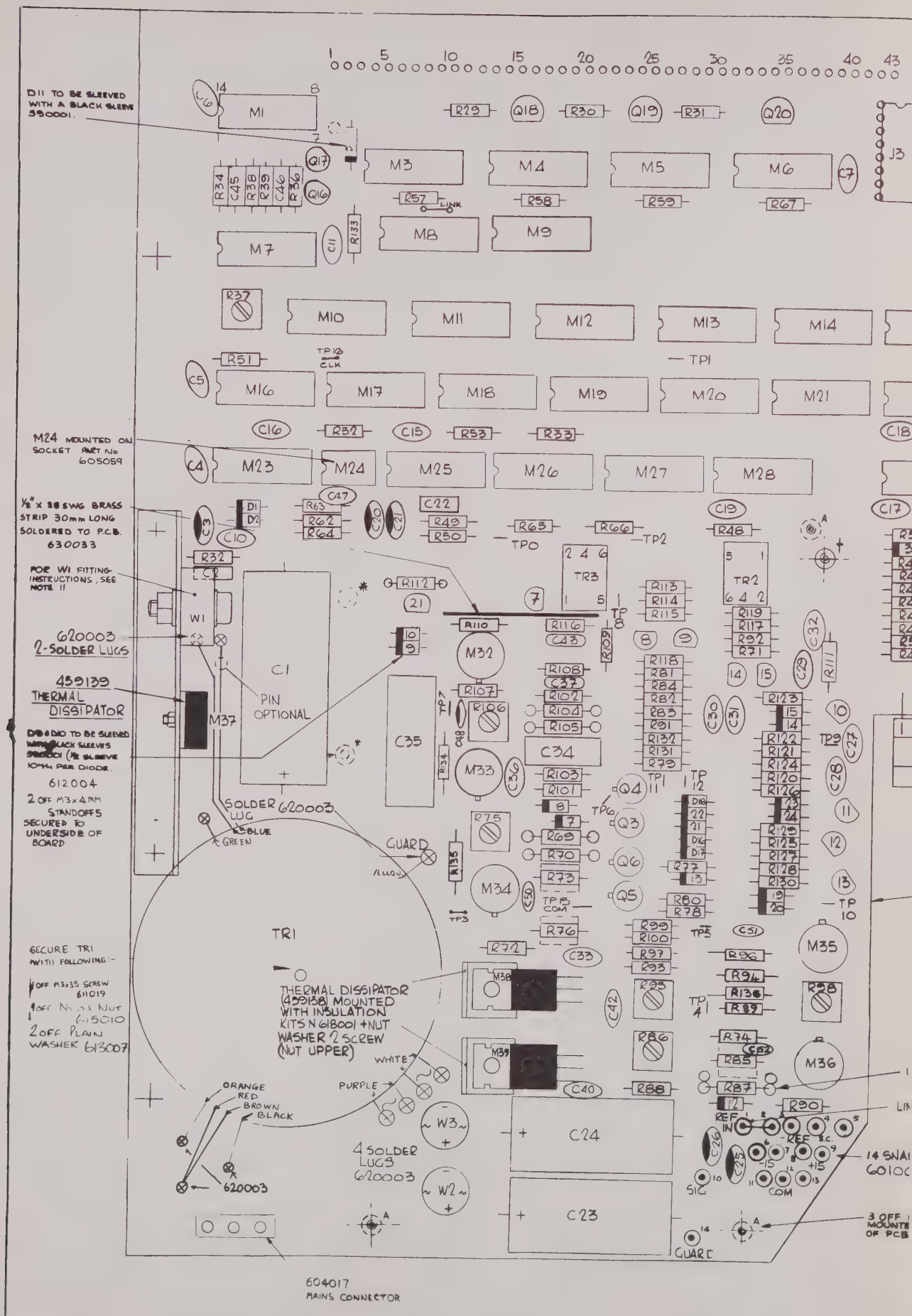
NOTES

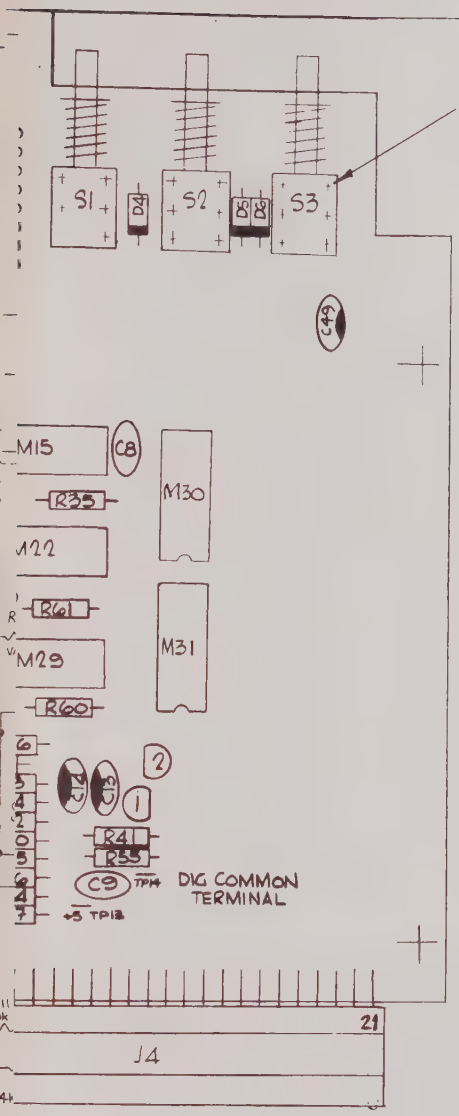
ISS.	CHANGES	
6	REDRAWN 8.2.78 KSS	
7	ECO 633 RG WAS 1K ·1% ¼W R7 DELETED 2. 18.3.78	MD
8	ECO·602 C.14 & 15 FROM ·02 TO·2% B.J. 14·3·78	AD



NOTE: D8-D26 = IN4148 DEVICES
D1-D7 = IN458A DEVICES

MATERIAL	datron ELECTRONICS LTD. NORWICH.	DRAWING SIZE
FINISH	TITLE: 1041 Ω CARD SCHEMATIC	DRAWING No: 430008
		SHEET: 1 OF 1


D11 TO BE SLEEVED WITH A BLACK SLEEVE 590001.
M24 MOUNTED ON SOCKET PART No 605059
½" x 28 SWG BRASS STRIP 30mm LONG SOLDERED TO P.C.B. 630033
FOR W1 FITTING INSTRUCTIONS, SEE NOTE 11
620003 2-SOLDER LUGS
459139 THERMAL DISSIPATOR
D8 & D10 TO BE SLEEVED WITH BLACK SLEEVES 590001 (½ SLEEVE 10mm PER DIODE.
612004 2 OFF M3x4mm STANDOFFS SECURED TO UNDERSIDE OF BOARD
SECURE TR1 WITH FOLLOWING:-
1 OFF M3x35 SCREW 611019
1 OFF NYLON NUT 615010
2 OFF PLAIN WASHER 613007
M1
M2
M3
M4
M5
M6
M7
M8
M9
M10
M11
M12
M13
M14
M16
M17
M18
M19
M20
M21
M23
M24
M25
M26
M27
M28
M32
M33
M34
M35
M36
M37
M38
M39
C1 PIN OPTIONAL
C35
C34
C24
C23
TR1
TR2
TR3
W1
W2
W3
SOLDER LUG 620003
BLUE
GREEN
YELLOW
GUARD
THERMAL DISSIPATOR (459138) MOUNTED WITH INSULATION KITS N 618001 + NUT WASHER 2 SCREW (NUT UPPER)
WHITE
PURPLE
ORANGE
RED
BROWN
BLACK
4 SOLDER LUGS 620003
620003
604017 MAINS CONNECTOR
LINK
TP1
TP2
TP3
TP4
TP5
TP6
TP8
TP9
TP10
TP11
TP12
TP13 COM
TP0
CLK
REF IN
REF
COM
GUARD
14 SWA
3 OFF MOUNTE OF PCB



PCB
419108-6

4 FSV TERMINAL 602001

K FOR NON RATIO

2-ON CONNECTIONS
52

M3 x 6 mm STANDOFFS 612008
D FROM UNDERSIDE (TRACK SIDE)
IN POSITIONS MARKED 'A'

NOTES:

1 J4 CONNECTOR TERMINALS MUST BE PREFORMED AS BELOW BEFORE SOLDERING.

2 FIT DIL PACKAGES WITH FOLLOWING:-
8 OFF 16 PIN DIL SOCKETS 605038
21 OFF 14 PIN DIL SOCKETS 605037

3 TERMINALS SHOWN ON RESISTOR LEGS (E.G. R87) ARE COMPONENT MOUNTING F.S.V.

4 TERMINALS MARKED AS SOLDER LUGS ARE FOR SOLDERED WIRE CONNECTIONS.

5 ALL OTHER TERMINALS ARE FOR SNAP-ON WIRE CONNECTIONS

6 TP'S ARE BENT LOOPS OF WIRE AS BELOW

7 ⊗ DENOTES SOLDER LUG CONNECTION TO TRANSFORMER

8 Q7 AND C38 SHOULD BE MOUNTED AS LOW AS POSSIBLE ON P.C.B

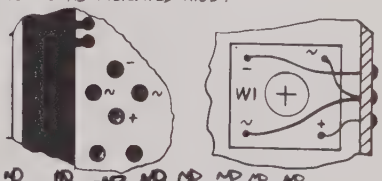
9 FIT GUARD SHIELD 450177 WITH THE FOLLOWING :-
SCREW M3 X 6 (611007) - 2 OFF
M3 SHAKEPROOF (613005) - 2 OFF
} ONE OFF EACH IN POSITIONS MARKED THUS *, SECURED FROM COMP. SIDE OF BOARD

FIT STANDOFF M3 X 22·2 mm (612005) IN POSITION MARKED THUS †. ON COMP SIDE OF PCB IN 4·4 Ø HOLE PROVIDED SECURE GUARD SHIELD WITH SCREW M3 X 10 (611006) & M3 SHAKEPROOF (613005) FROM COMP SIDE OF BOARD

10 FIT INSULATING BUSH TO M37, M38 & M39 AND SMEAR WITH HEATSINK COMPOUND 900003. ALSO FIT MICA WASHER TO M37.

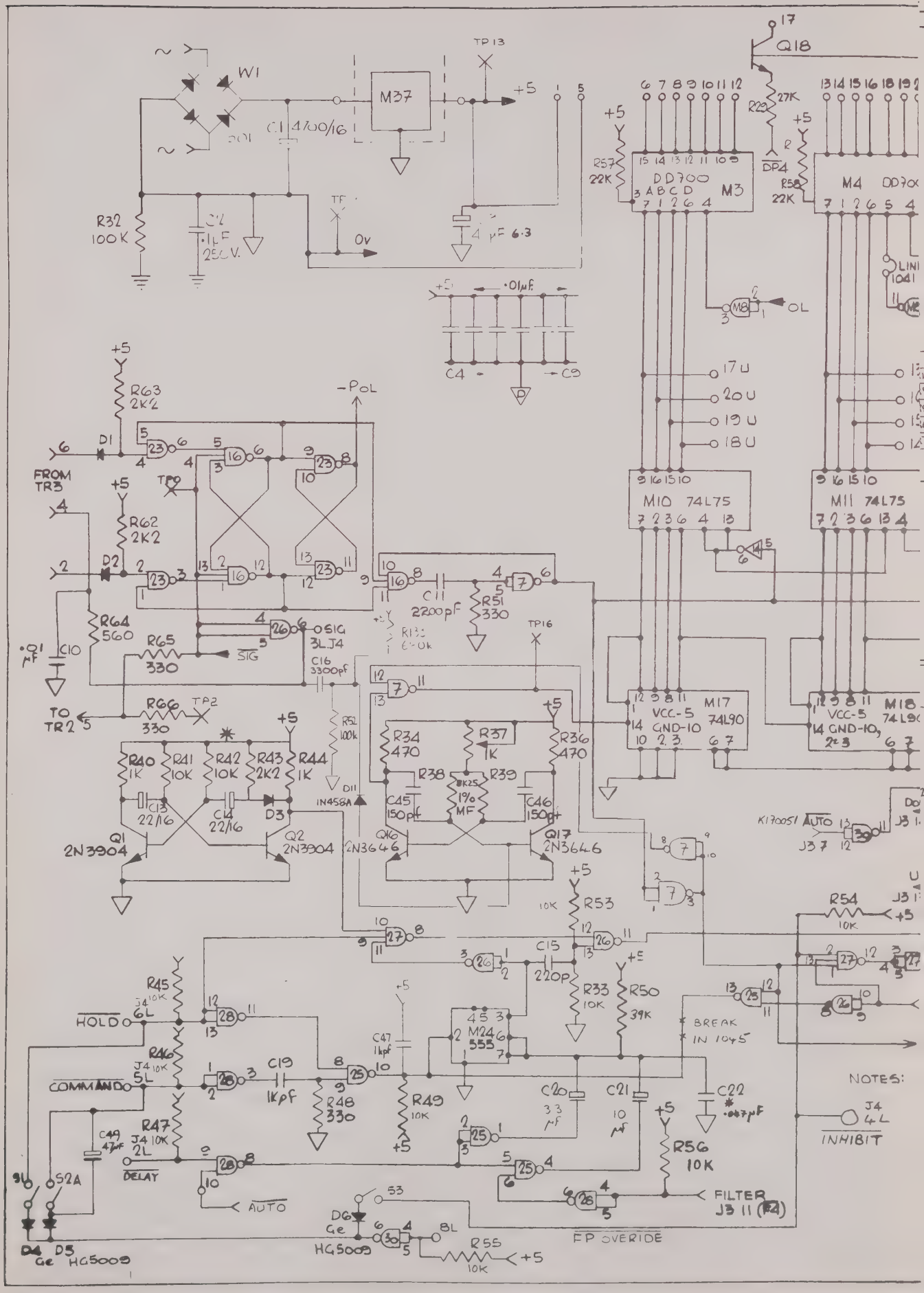
11 RECTIFIER BRIDGE (W1) FITTING INSTRUCTIONS :-
a) APPLY HEATSINK COMPOUND (900003) BETWEEN MATING FACES OF HEATSINK AND W1. BEFORE SECURING WITH SCREW, NUT & WASHERS (PART NOS 611005, 615002 & 613005 - 2 OFF) TO HEATSINK

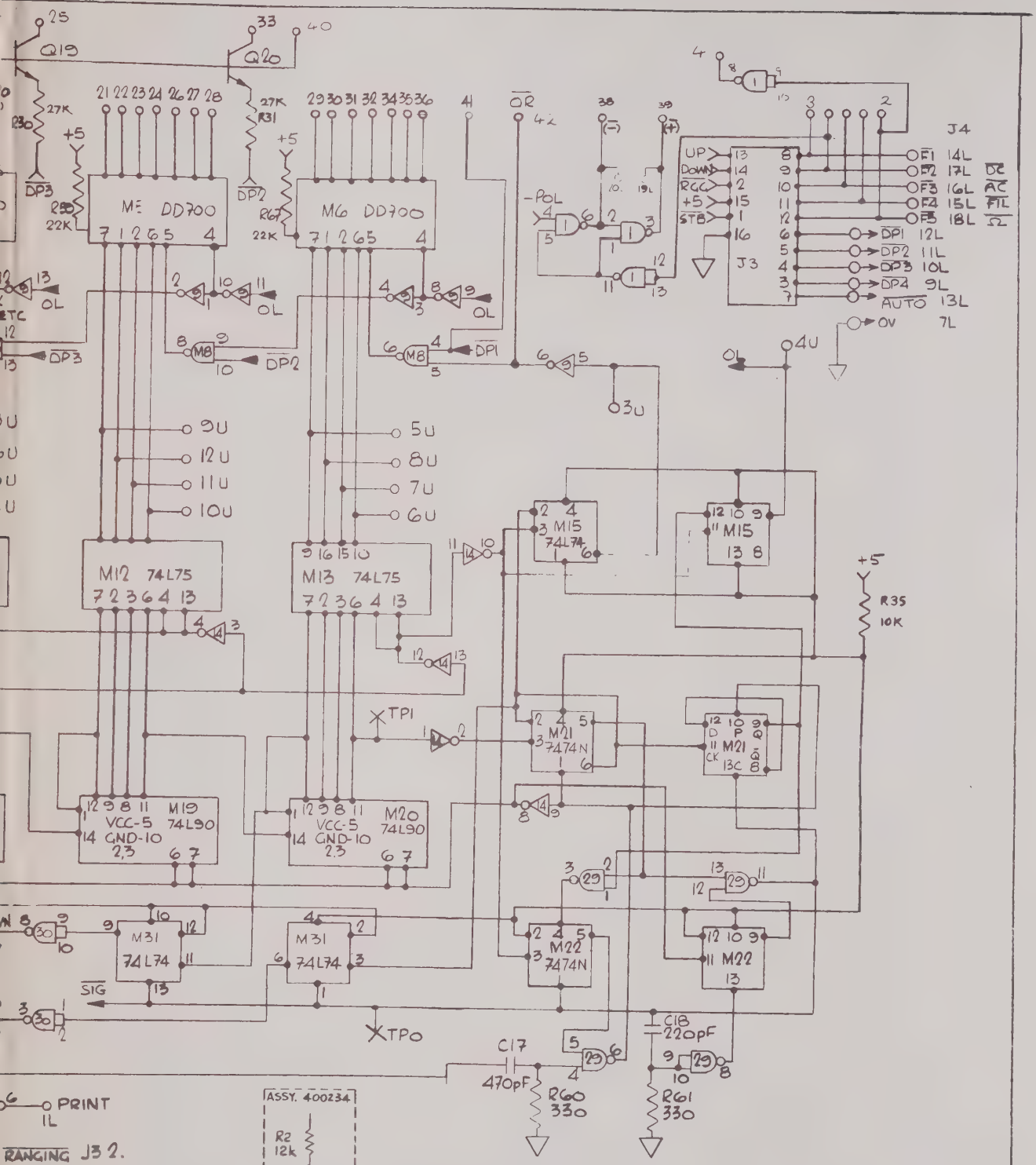
b) CONNECT TERMINAL WIRES TO PCB AS INDICATED THUS :
TERMINAL LEADS TO BE SLEEVED (590001 - 4 OFF)



12 CAPACITORS C1, C23 & C24 TO BE BEDDED IN SILICON RUBBER COMPOUND (900004) TO PREVENT COMPONENT DAMAGE UNDER VIBRATION ETC

| | | |


W1
C1 4700/16
M37
TP13
+5
R32 100K
C2 .1µF 250V.
TP
0V
4 µF 6.3
Q18
R23 27K
R57 22K
R58 22K
DD700
M3
M4
M8
OL
17 U
20 U
19 U
18 U
M10 74L75
M11 74L75
-POL
R63 2K2
R62 2K2
R64 560
R65 330
R66 330
C10 .01 µF
C11 2200pF
R51 330
C16 3300pf
R52 100k
R34 470
R37 1K
R36 470
R38
R39
C45 150pf
C46 150pf
R40 1K
R41 10K
R42 10K
R43 2K2
R44 1K
C13 22/16
C14 22/16
D3
D11 IN458A
Q1 2N3904
Q2 2N3904
Q16 2N3646
Q17 2N3646
M17 74L90
M18 74L90
VCC-5 GND-10
R53 10K
R54 10K
C15 220P
R33 10K
R50 39K
R45 10K
R46 10K
R47 10K
C19 1Kpf
R48 330
R49 10K
C47 1kpf
M246 555
C20 33 µF
C21 10 µF
C22 .047µF
R56 10K
R55 10K
C49 47pf
HOLD
COMMAND
DELAY
AUTO
BREAK IN 1045
INHIBIT
FILTER J3 11 (#2)
FP OVERIDE
S1
S2A
S3
D4 Ge HG5009
D5 HG5009
D6 Ge HG5009
NOTES:



DATE	22-4-74
R&D	
CHECK	
PROD	A.A.D. 2.2.77

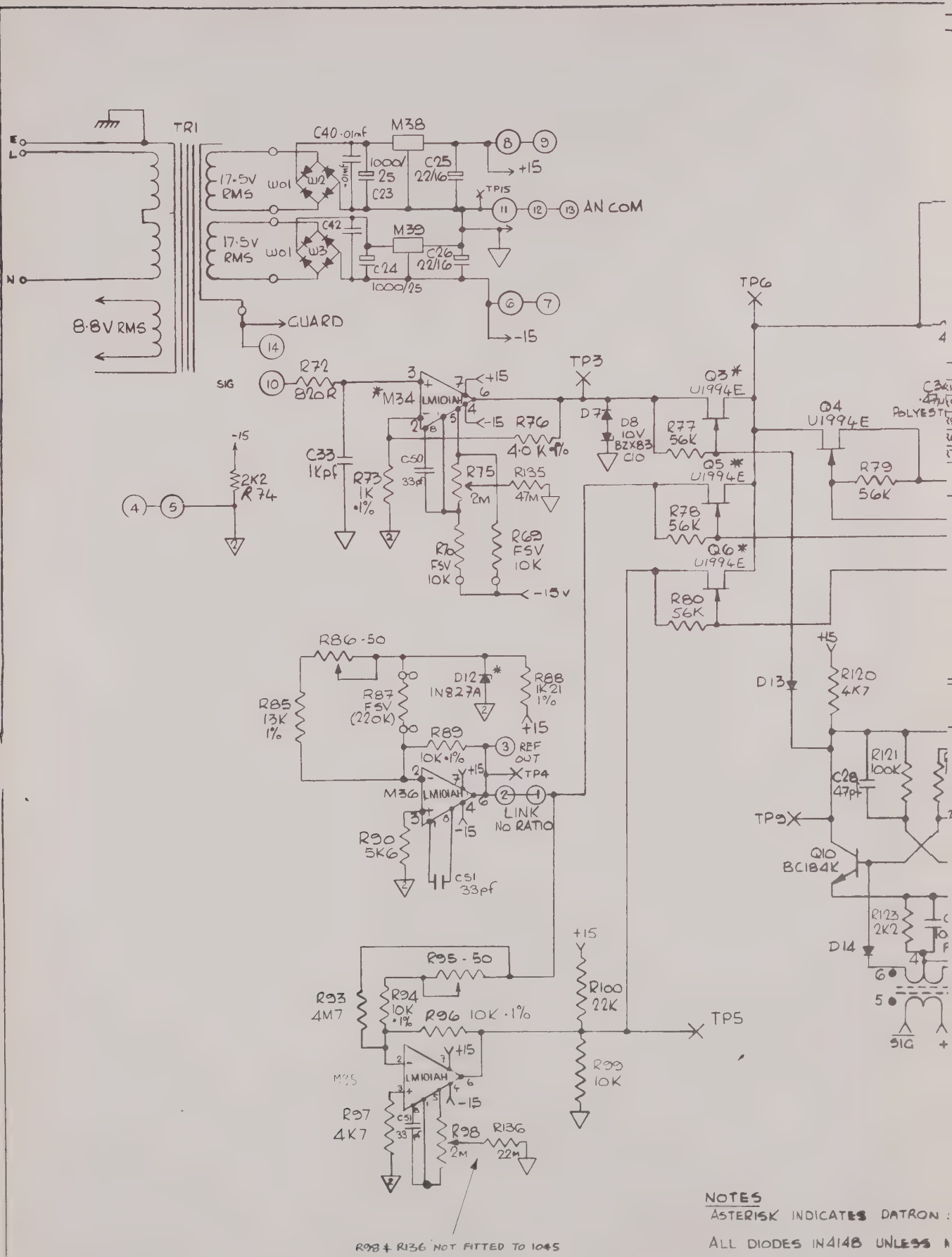
datron ELECTRONICS LTD

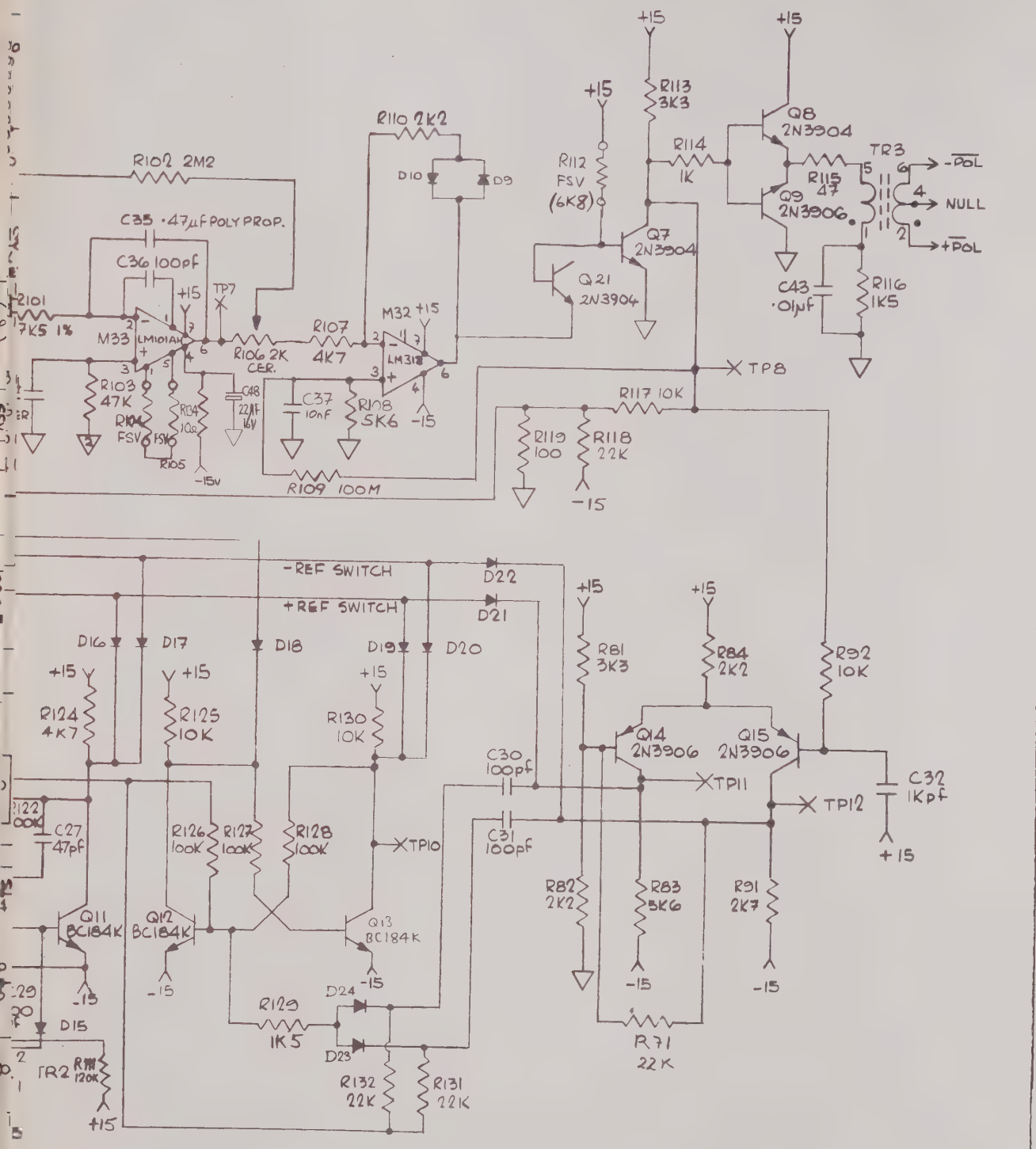
TITLE: A-D DISPLAY DIGITAL SECTION 1045/1041/1241

ISS. 3	ISS. 4	ISS 5	7	8	9	10
ECO. 82	284	324	398	523	671	738

DRAWING NUMBER 430004 ISSUE 23

SHEET 1 of 2


TR1
E
L
N
17·5V RMS
W01
W02
W03
C40 ·01mf
1000/25
C23
C25 22/16
M38
M39
C42
C24
C26 22/16
1000/25
+15
-15
TP15
AN COM
8·8V RMS
GUARD
SIG
R72 820R
M34 LM101AH
R76 4·0K 1%
C33 1Kpf
C50 33pf
R73 1K 1%
R75 2M
R135 47M
R70 FSV 10K
R69 FSV 10K
-15 V
2K2 R74
TP3
TP6
D7
D8 10V BZX83 C10
Q3* U1994E
Q4 U1994E
Q5* U1994E
Q6* U1994E
R77 56K
R78 56K
R79 56K
R80 56K
C34 POLYESTER
R86 ·50
R85 13K 1%
R87 FSV (220K)
D12 IN827A
R88 1K21 1%
R89 10K 1%
REF OUT
TP4
M36 LM101AH
LINK NO RATIO
R90 5K6
C51 33pf
D13
R120 4K7
R121 100K
C28 47pf
TP5
Q10 BC184K
R123 2K2
D14
R95 ·50
R93 4M7
R94 10K 1%
R96 10K 1%
R100 22K
R99 10K
M35 LM101AH
R97 4K7
R98
R136
2M
22M
R98 & R136 NOT FITTED TO 1045
NOTES
ASTERISK INDICATES DATRON
ALL DIODES IN4148 UNLESS



SELECTED COMPONENTS

NOTED OTHERWISE

9	8	7	6	5	ISS. 4	ISS. 3
WT. 1	SHT. 1	SHT1	20A	MOD 150	ECO 113 116	ECO. 86

DATE	18·4·74
R & D	
CHECK	
PROD.	L. A. Dunn 2.2.77
NEXT DRG	PCB ASSY 409109/120

datron ELECTRONICS LTD

TITLE: A-D DISPLAY ANALOG SECTION 1045/1041/1241

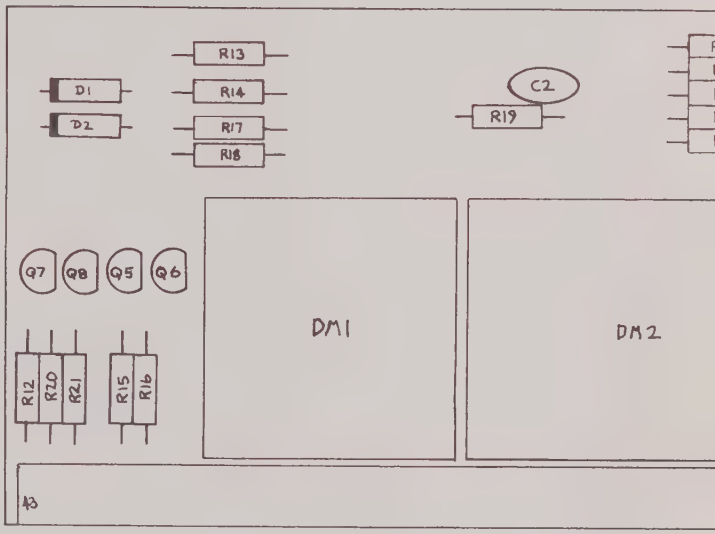
DRAWING NUMBER: 430004 ISSUE 2 84

SHEET 2 OF 2

DRAWING No.
400026
FIRST USED ON
1041

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



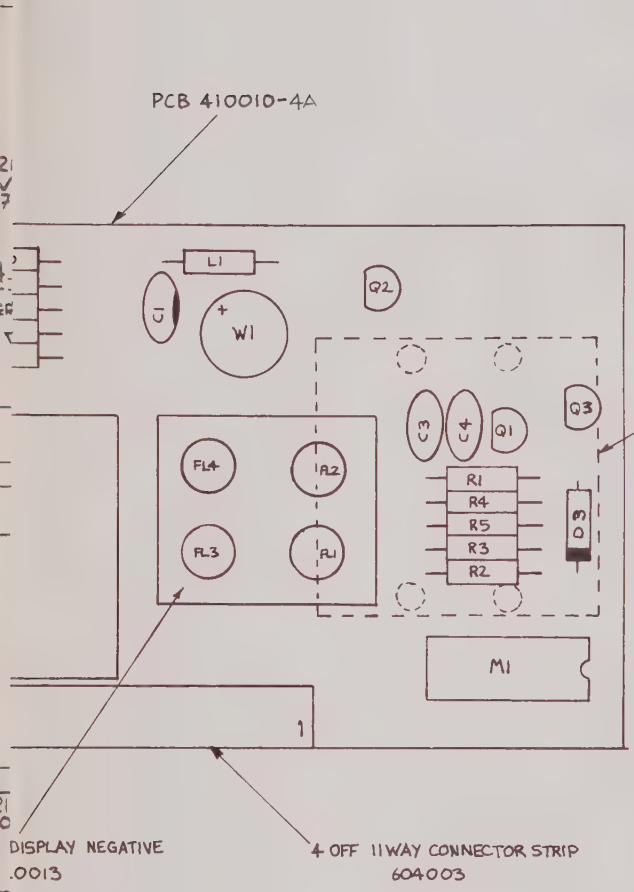
FUNCTION
4

DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES ANGULAR ± ½°	MATERIAL
PJH		MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64	
TRACED	APPROVED	SCALE	METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ± 4mm	FINISH
DATE 25.11.76	DATE 25.11.76	NOT TO BE SCALED	UNLESS OTHERWISE STATED	

JW 1162

4	5	6
ALL BURRS TO BE REMOVED		NOTES

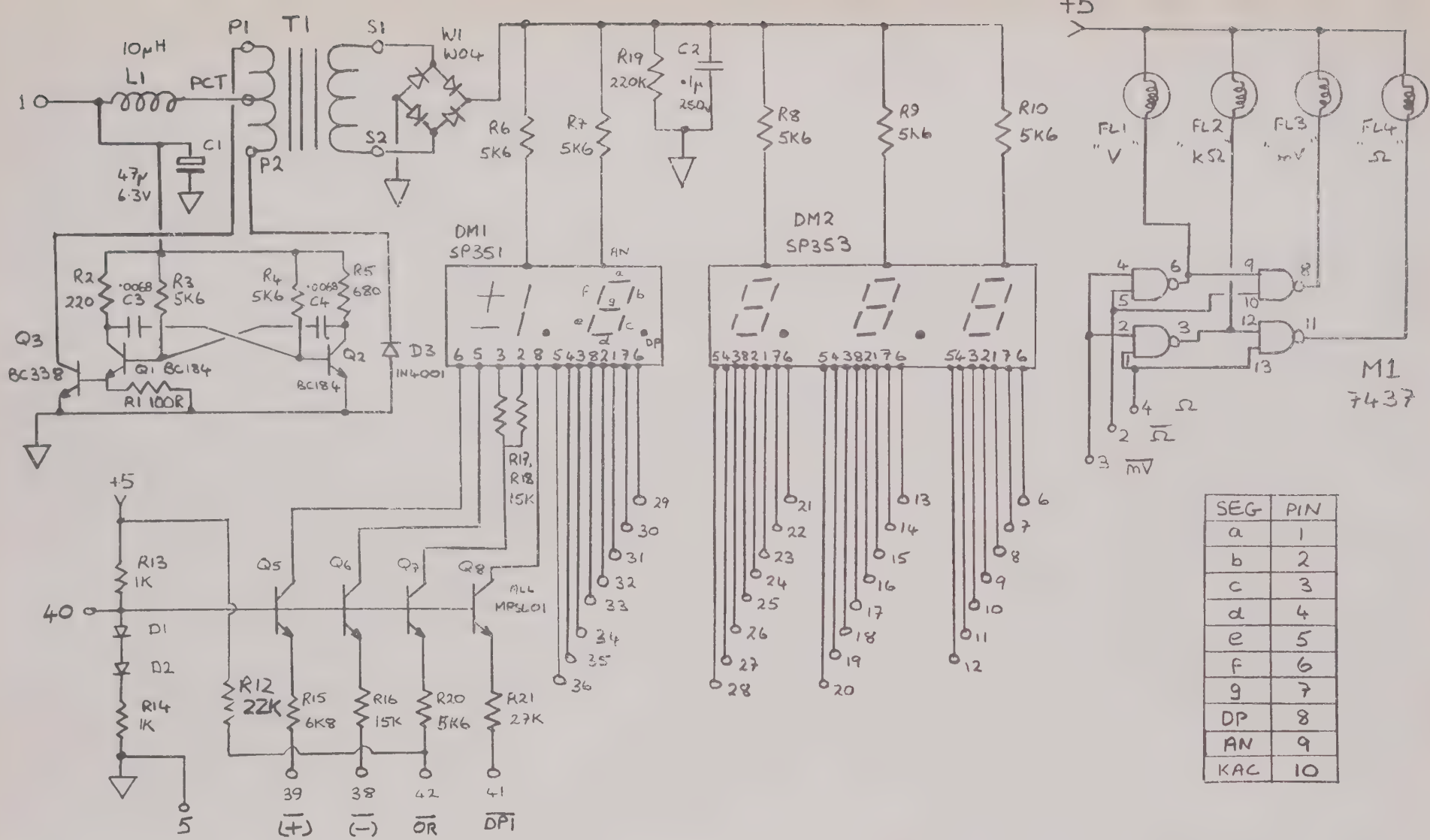
ISS	CHANGES
3	REDRAWN WITH MINOR RELEASE TO 1054 PCB ECO 26.11.76 PJH
5	PTS. LTS. CHANGES ECO 363. PJH.
6	PTS. LTS. CHANGES ECO 438 PJH. 30.3
7	PTS. LTS. CHANGES ECO 438 IV A1. 3.7
8	DIL socket change ECO 513, 6-7-77, PJH
9	PCB NEW ISS. ECO 641 BJ 29-3-78
9	R1 WAS 1K (000102) ECO 717 25-8-78 W.G.S.



datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

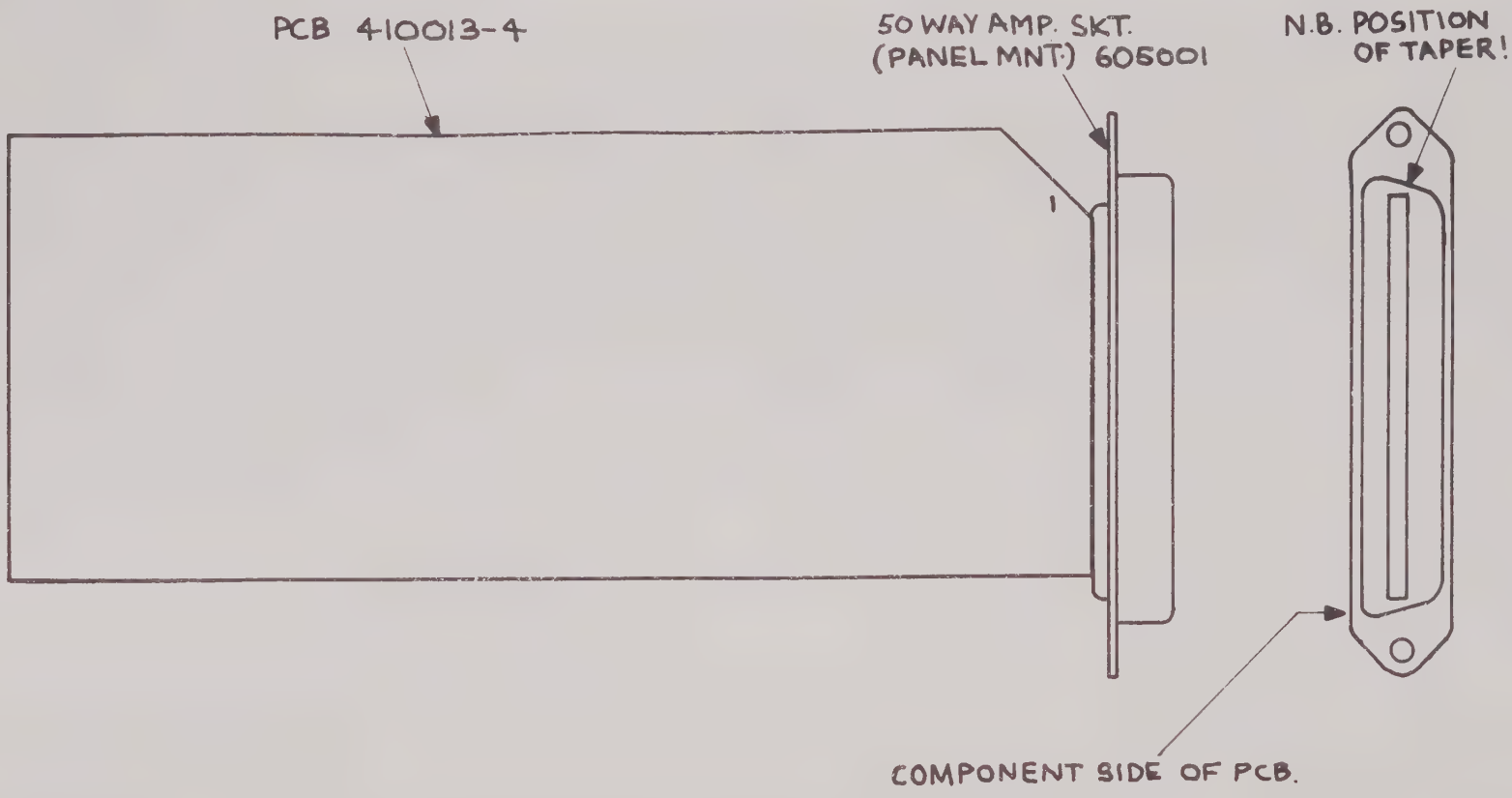
TITLE	DRAWING No.	SHEET
1041 DISPLAY PCB	400026	1 OF 3



SEG	PIN
a	1
b	2
c	3
d	4
e	5
f	6
g	7
DP	8
AN	9
KAC	10

ISS	ECO	DATE. 20-11-74	datron ELECTRONICS LTD.
4	438		
5	439	DRAWN BY. RRP	TITLE 1041 DISPLAY SCHEMATIC
ND	717	CHECK	
		NEXT DRAWING 400026	DRAWING NUMBER 430007
		REV 3	SHEET 1 OF 1

THIRD ANGLE PROJECTION
DRAWN IN ACCORDANCE WITH B.S. 308



DRAWN KJS.	CHECKED MD	DIMENSIONS IN MILLIMETRES	TOLERANCE UNLESS OTHERWISE STATED	MATERIAL	datron ELECTRONICS LTD. NORWICH	DRAWING SIZE A4
TRACED	APPROVED	SCALE NOT TO BE SCALED		FINISH	TITLE B01 BCD ASSEMBLY 1030/41/45	DRAWING No. 400348 SHEET 1 OF 2
DATE 2·3·79	DATE					

1	2	3

DRAWING No. 430348.

FIRST USED ON 1030

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308

A

B

C

D

UPPER

20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2 — NC
1 — NC

LOWER

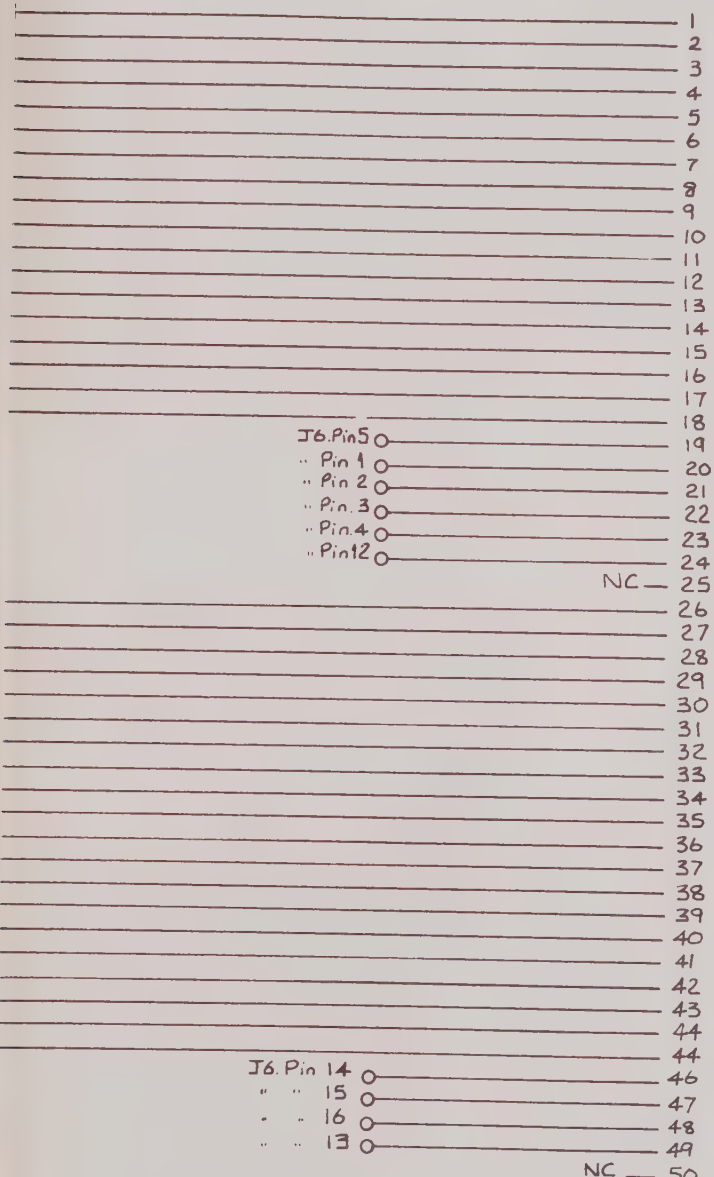
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES ANGULAR ± ½°	MATERIAL
B.J.	MD	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ± 005 DECIMAL TO 2 PLACES ± 010 FRACTIONAL ± 1/64	
TRACED	APPROVED	SCALE	METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ± 4mm	FINISH
DATE 7-3-78	DATE	NOT TO BE SCALED	UNLESS OTHERWISE STATED	

J W 1142

4	5	6	ISS	CHANGES
ALL BURRS TO BE REMOVED		NOTES	1	

NC = Not Connected.



datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE

B.O.I B.C.D SCHEMATIC

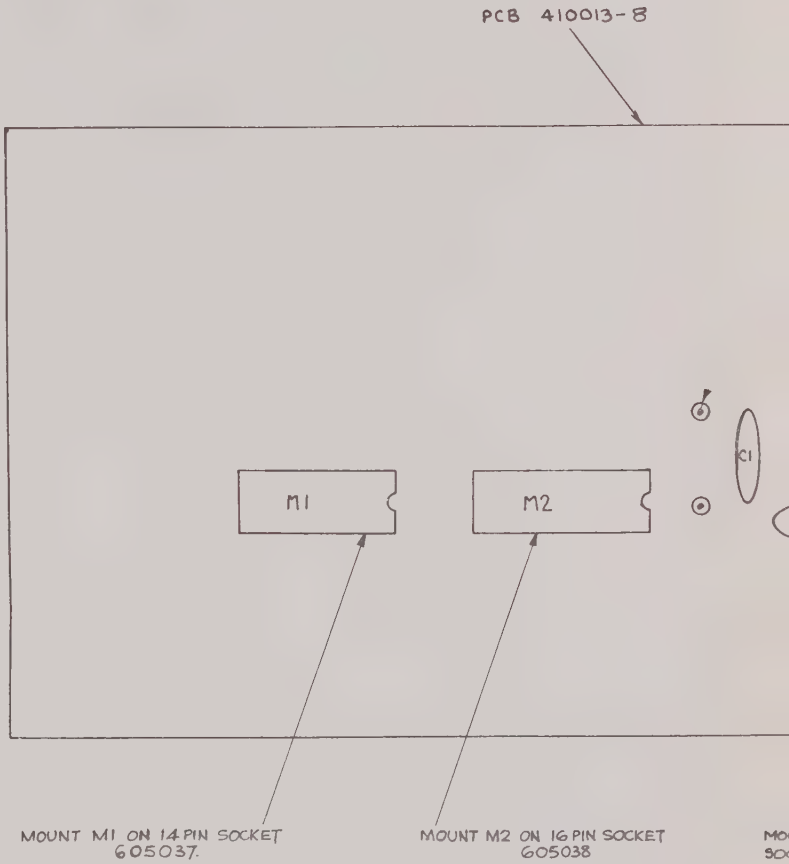
DRAWING No. 430348

SHEET 1 OF 1

DRAWING No.
400058
FIRST USED ON 1041

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES ANGULAR ± ½°	MATERIAL
FSH	S.C.M	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ± 005 DECIMAL TO 2 PLACES ± 010 FRACTIONAL ± 1/64	/
TRACED	APPROVED L.A.D.	SCALE	METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ∓ 4mm	FINISH /
DATE 29.11.76	DATE 2.2.77	NOT TO BE SCALED	UNLESS OTHERWISE STATED	

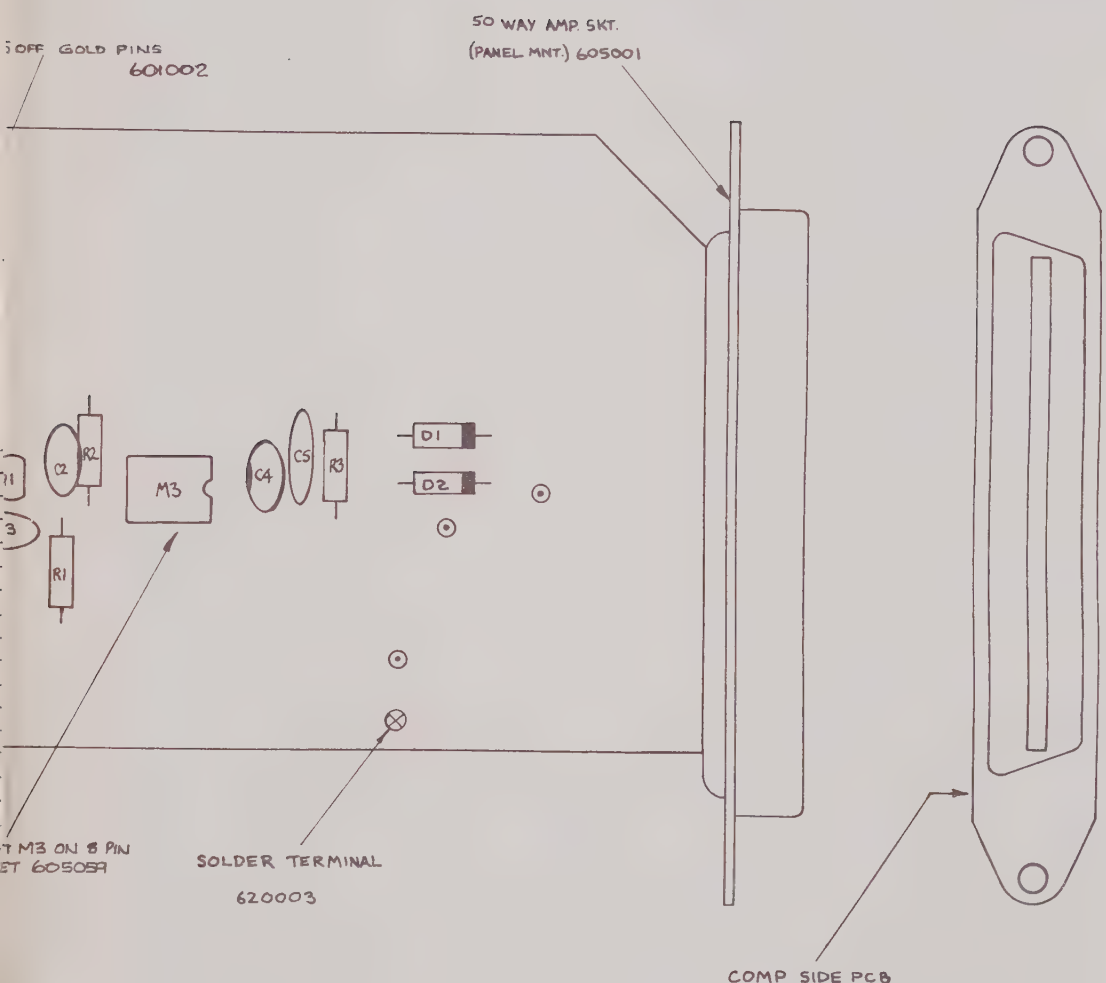
J W 1162

4 | 5 | 6

ALL BURRS TO BE REMOVED

NOTES

3	Resistors R1, R2 added ECO 358 29.11.76
4	ECO 381-1 M3 dr. added. P/L
5	ECO 381-2 Links REMOVED. P/L C3 moved. 21.2.77
6	ECO 586 Add D1 D2 5 gold pins 4-1-78 BJ
7	ECO. 622. IC. MOUNTING SKTS INDICATED. IL. 14.3.78
8	E.C.O 733 P/LIST MOD 30-8-78 W.G.S



datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE: 1030, 1041, 1045 BCD BOARD ASSY B01a

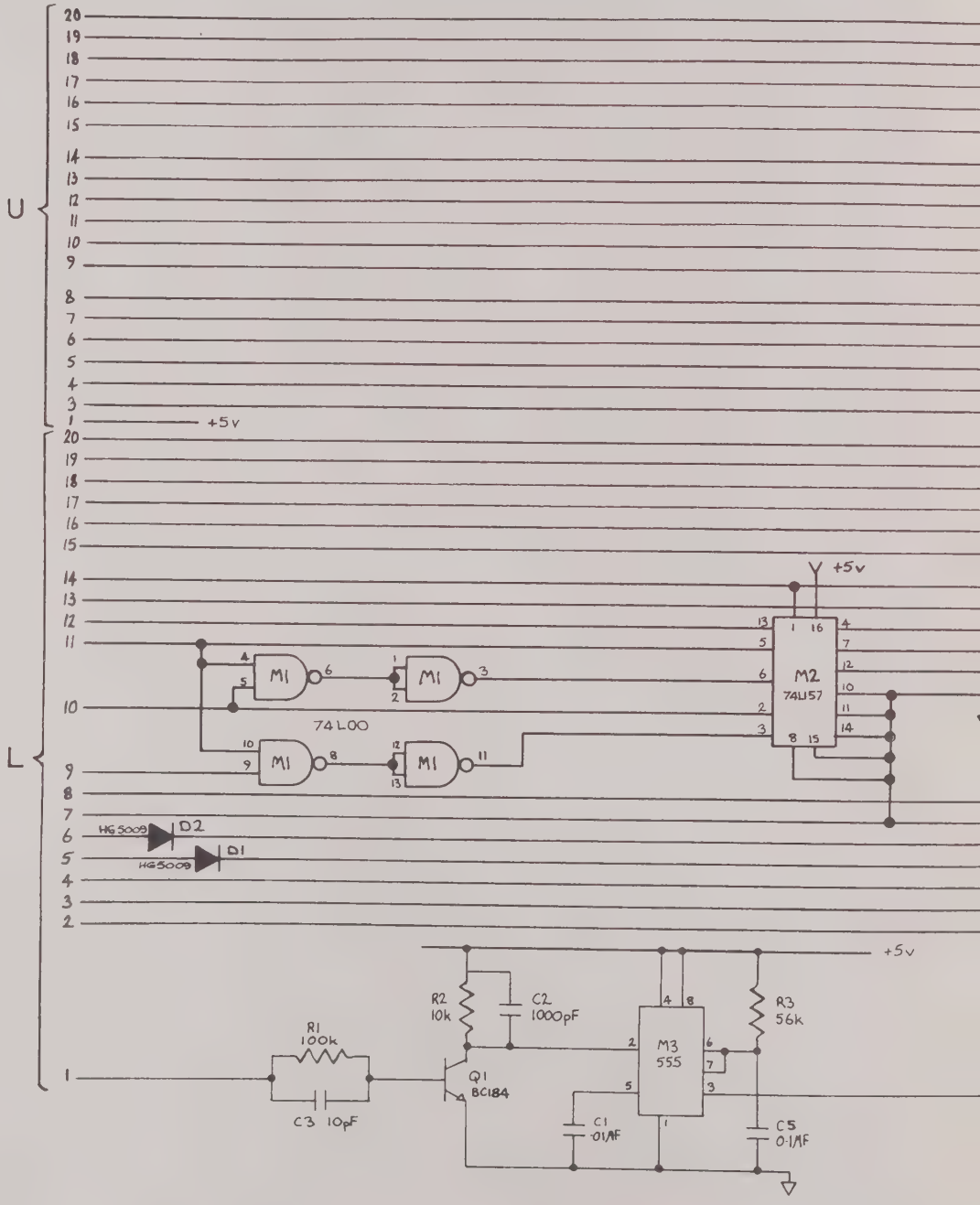
DRAWING No. 400058

SHEET 1 OF 2

DRAWING No.	
430042	
FIRST USED ON	

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN	CHECKED
FJH	D.C.L.
TRACED	APPROVED
	L.A.B.
DATE 22.2.77	DATE 22.2.77

DIMENSIONS IN MILLIMETRES

SCALE NOT TO BE SCALED

TOLERANCES ANGULAR ± ½°

INCH DIMENSIONS
- DECIMAL TO 3 PLACES ± .005
- DECIMAL TO 2 PLACES ± .010
- FRACTIONAL ± 1/64

METRIC DIMENSIONS
- DECIMAL TO 2 PLACES ± 1mm
- DECIMAL TO 1 PLACE ± 2mm
- WHOLE DIMENSIONS ± 4mm

UNLESS OTHERWISE STATED

MATERIAL

FINISH

JW 1162

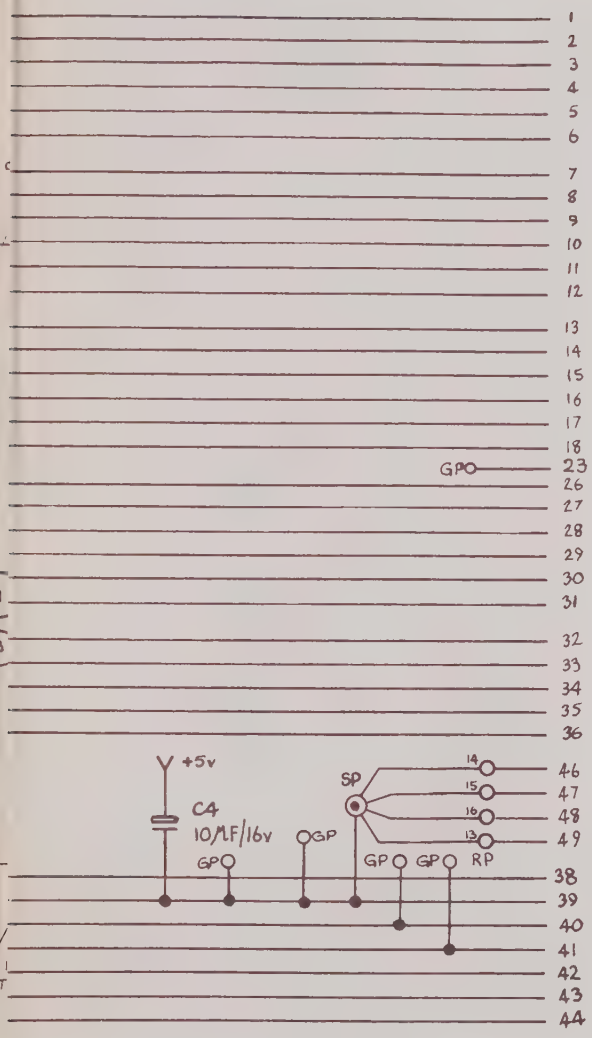
4	5	6

ALL BURRS TO BE REMOVED

NOTES

1. RP = REMOTE PROG. SOCKET (1030 OPTION)
2. SP = SHORTING PAD (REMOVED WITH ABOVE OPTION IN.)
3. GP = GOLD PIN

ISS.	CHANGES
4	Redrawn. PJH 14-9-77.
5	ECO 586 BJ. 4-1-77.



datron ELECTRONICS LTD. NORWICH.

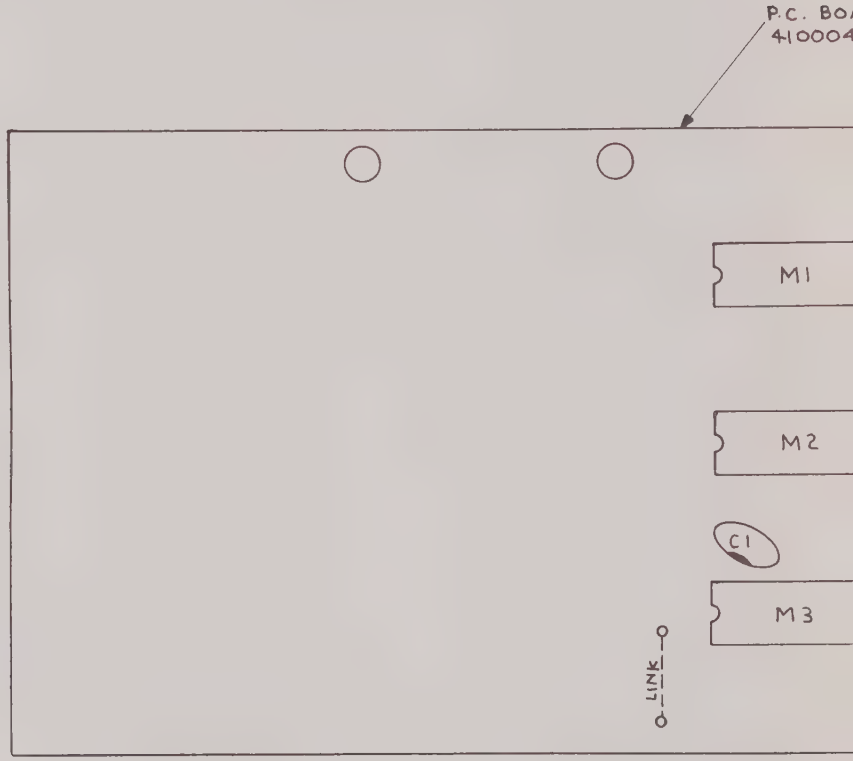
DRAWING SIZE A2

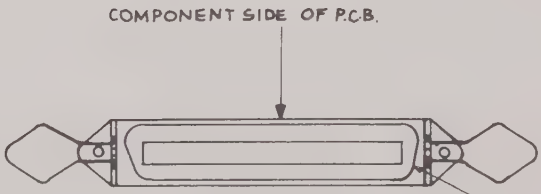
TITLE	DRAWING No.	SHEET
BCD - BO1a 1030 1041 1045	430042	1 OF 1

DRAWING No.
400349
FIRST USED ON 1030

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308

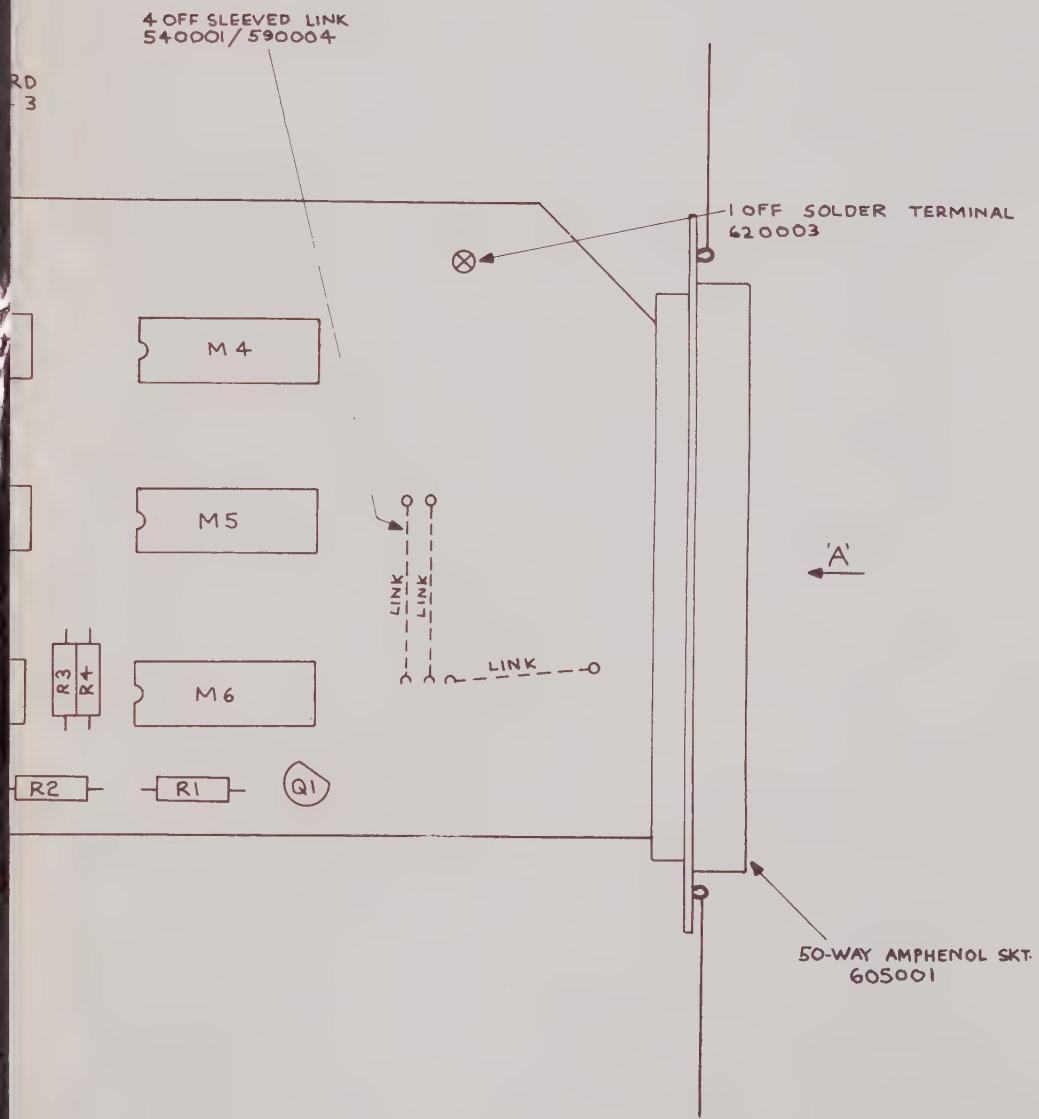




1:1 VIEW ON ARROW 'A' TO SHOW ORIENTATION OF CONNECTOR / P.C.B.

DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES ANGULAR ± ½°	MATERIAL
K.S.S.	MD	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64	
TRACED	APPROVED	SCALE	METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ∓ 4mm	FINISH
DATE 2·3·78	DATE	NOT TO BE SCALED	UNLESS OTHERWISE STATED	

4	5	6	ISS.	CHANGES
ALL BURRS TO BE REMOVED		NOTES 1. FIT M1 – M6 IN DIL SOCKETS 605038	1	



datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE TRI-STATE B.C.D. ASSY. B.O.2.
1030, 1041, 1045

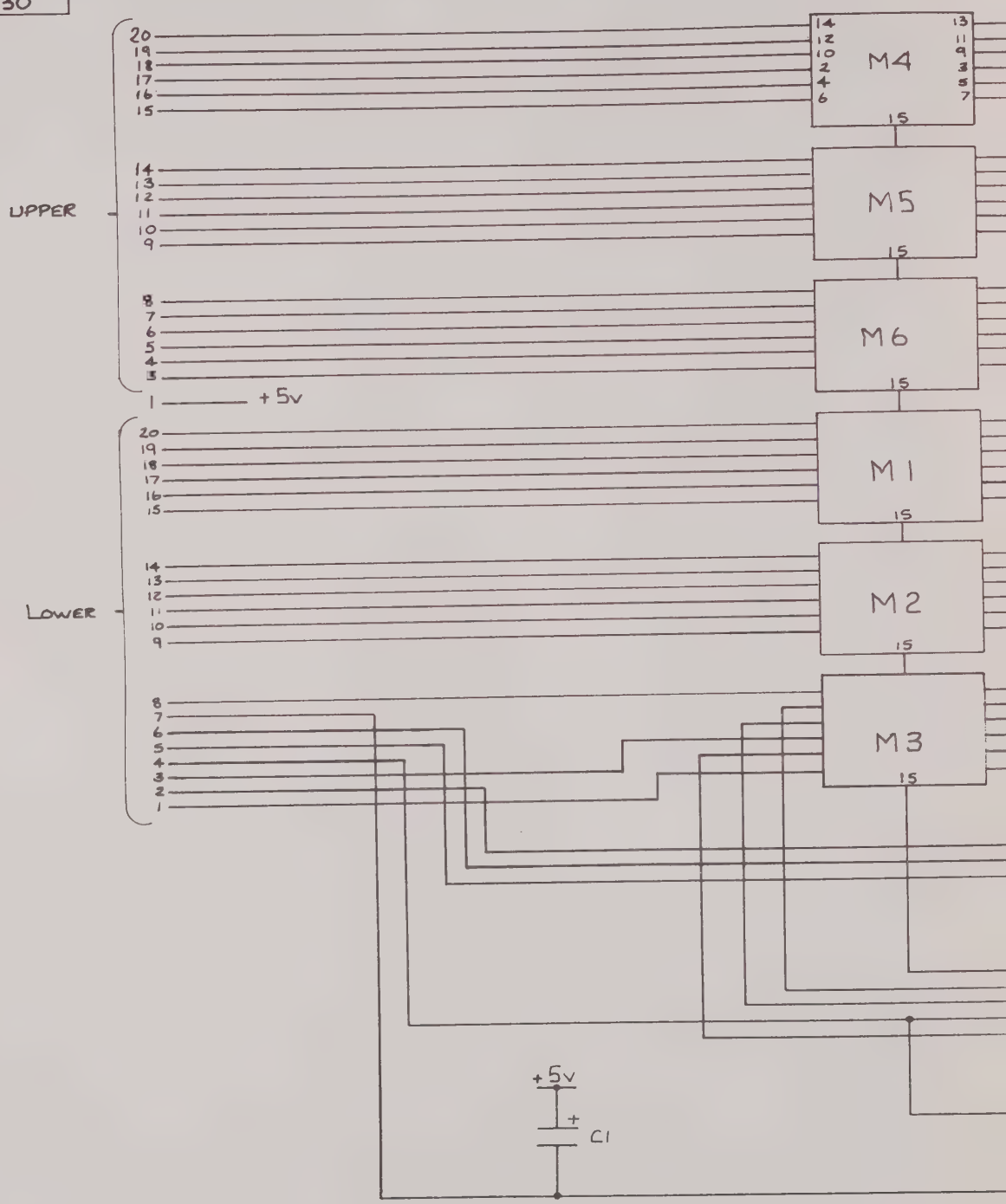
DRAWING No. 400349

SHEET 1 OF 2

DRAWING No.
430349
FIRST USED ON 1030

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



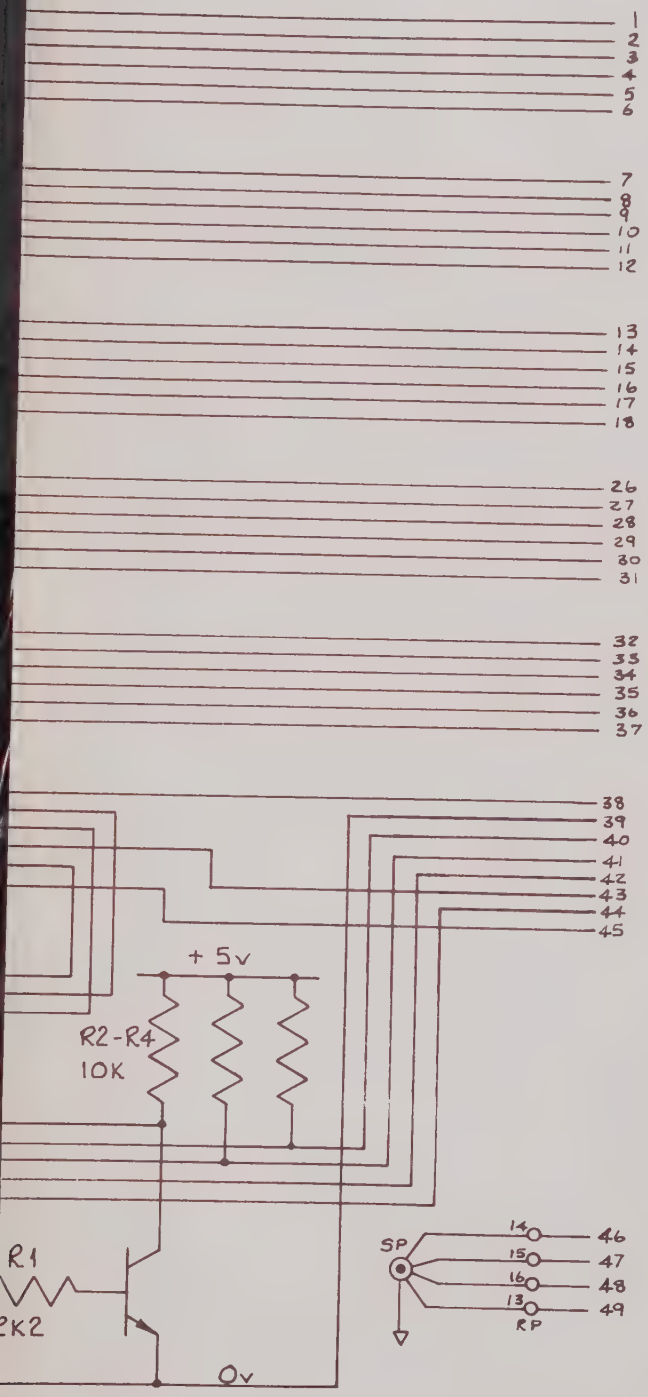
DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES ANGULAR ± ½°	MATERIAL
K.S.S.	MD	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64 METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ± 4mm UNLESS OTHERWISE STATED	
TRACED	APPROVED	SCALE		FINISH
DATE 3-3-78	DATE	NOT TO BE SCALED		

J W 1162

4 | 5 | 6

L BURRS TO BE REMOVED

NOTES



datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE

TRI-STATE B.C.D B.O.2

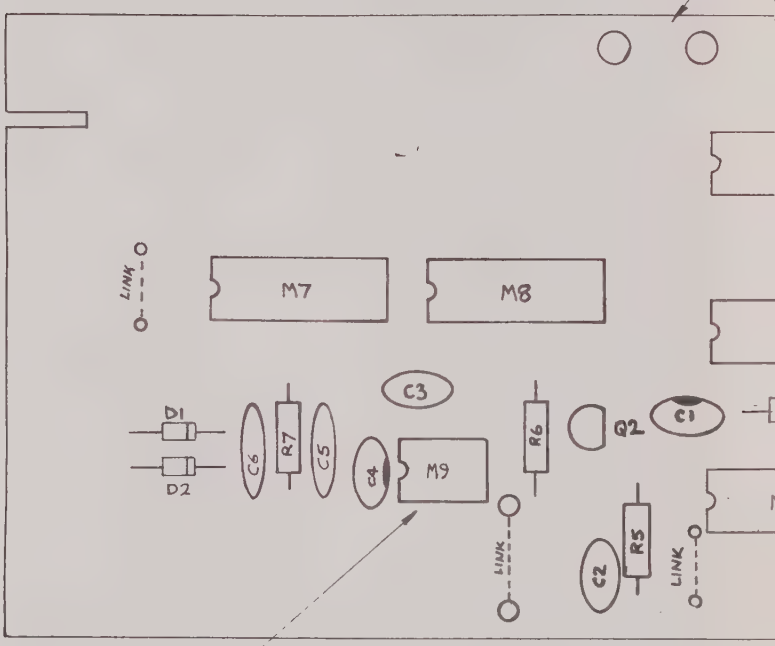
DRAWING No. 430349

SHEET 1 OF 1

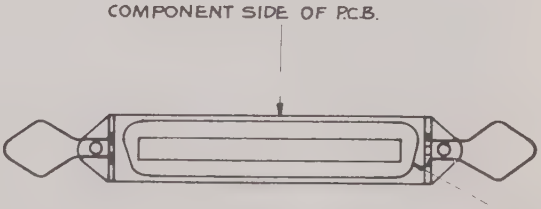
DRAWING No.
400023
FIRST USED ON 1030

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



M9 MOUNTED IN SOCKET 605059.



N.B. P
O

1:1 VIEW ON ARROW 'A' TO SHOW ORIENTATION OF CONNECTOR / P.C.B.

DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES ANGULAR ± ½°	MATERIAL
M.J.D.	I M		INCH DIMENSIONS	
TRACED	APPROVED	MILLIMETRES	DECIMAL TO 3 PLACES ± .005	
	L.A.D.		DECIMAL TO 2 PLACES ± .010	
DATE	DATE	SCALE	FRACTIONAL ± 1/64	FINISH
18.2.76	2.2.77	2:1	METRIC DIMENSIONS	
		NOT TO BE SCALED	DECIMAL TO 2 PLACES ± .1mm	
			DECIMAL TO 1 PLACE ± .2mm	
			WHOLE DIMENSIONS ± .4mm	
			UNLESS OTHERWISE STATED	

J W 1162

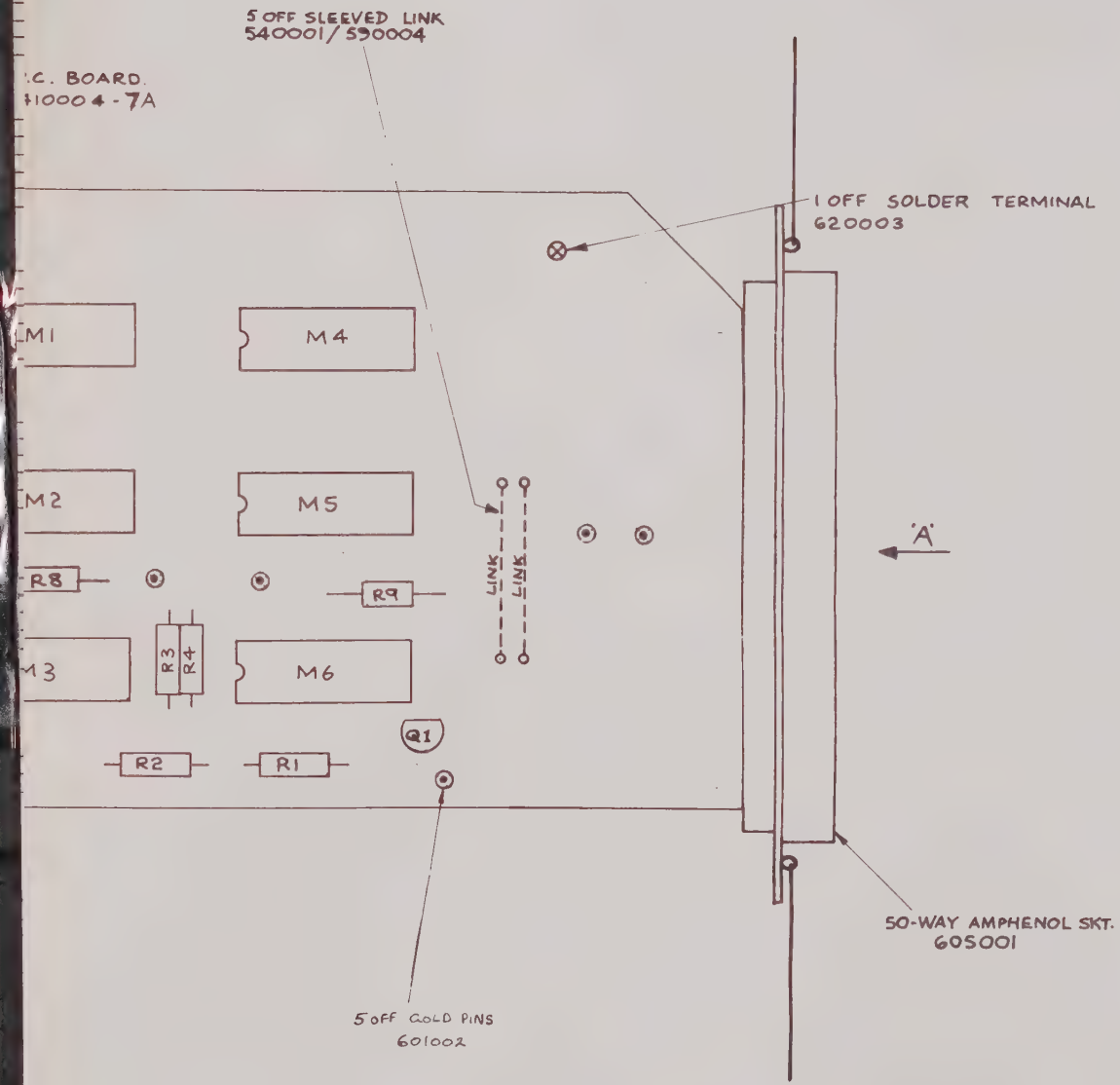
4 | 5 | 6

ALL BURRS TO BE REMOVED

NOTES

1. FIT M1 – M8 IN DIL SOCKETS 602004 AND BUCKETS 602005

ISS	CHANGES
2	REDRAWN. TO 156.2 AETW M.J.D. 18.2..
3	ECO 198 TRACK WIRE MOVED. M.J.D. 12.8.7
4	ECO 265 PCB 153 WAS 4..M7 & M8 Added. BH
5	ECO 380-1 17.2.77 PJH
6	ECO 380-2 17.2.77 PCB ISS
7	ECO 584 1-11-77 PCBISS
8	ECO 643 B. 29-3-78 PCB 7
9	ECO 733/681. P/LIST MOD 30-8-78 W.G.S



OSITION
F TAPER

datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE TRI-STATE B.C.D. ASSY. B.0.2 a
1030, 1041, 1045

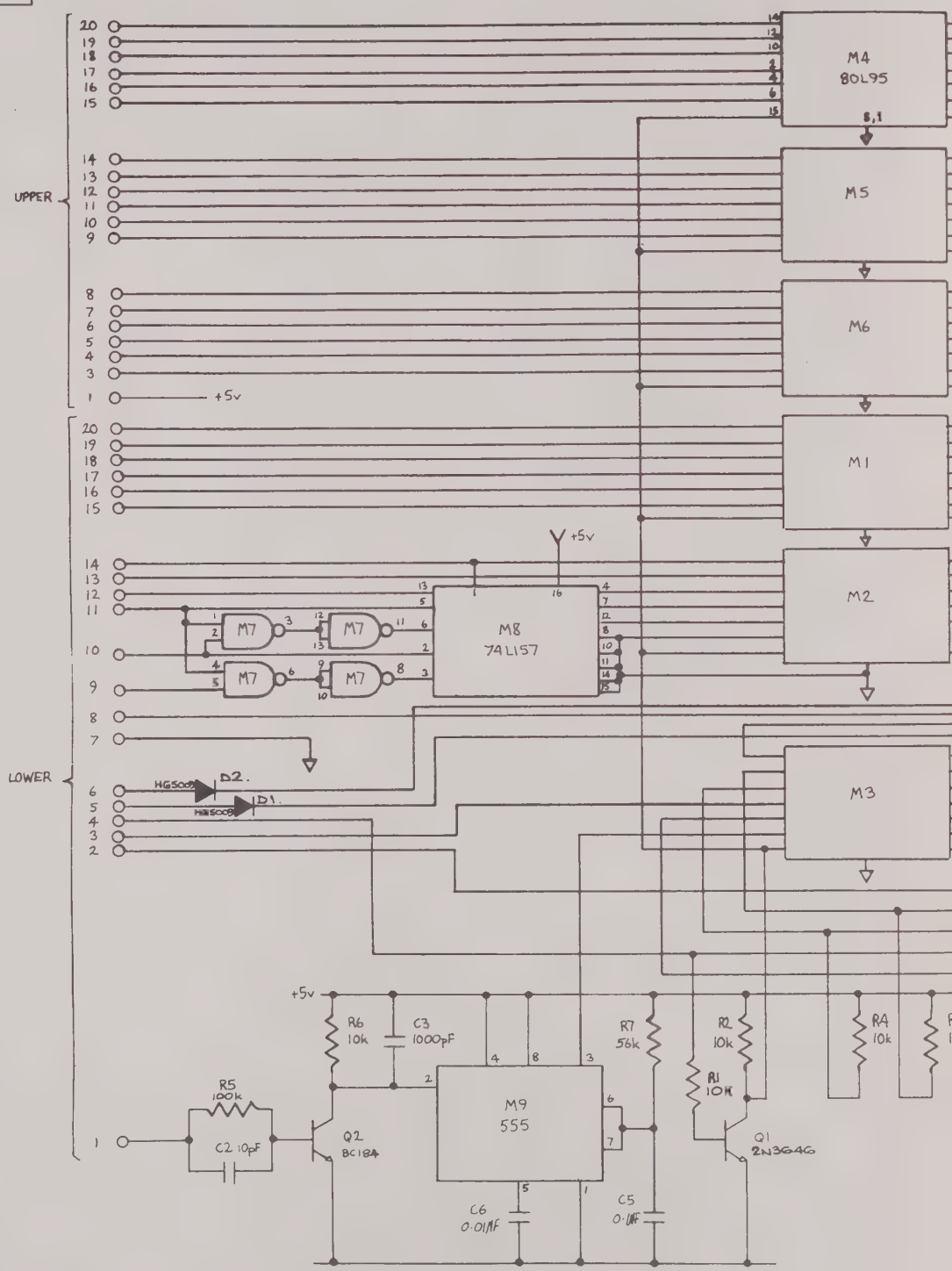
DRAWING No. 400023

SHEET 1 OF 2

DRAWING No.	
430002	
FIRST USED ON	

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN	CHECKED
TJH	D.S.W.
TRACED	APPROVED
	L.A.D.
DATE	DATE
14.3.77	2.2.77

DIMENSIONS IN MILLIMETRES

SCALE NOT TO BE SCALED

TOLERANCES ANGULAR ± ½°

INCH DIMENSIONS
- DECIMAL TO 3 PLACES ± .005
- DECIMAL TO 2 PLACES ± .010
- FRACTIONAL ± 1/64

METRIC DIMENSIONS
- DECIMAL TO 2 PLACES ± 1mm
- DECIMAL TO 1 PLACE ± 2mm
- WHOLE DIMENSIONS ± 4mm

UNLESS OTHERWISE STATED

MATERIAL

FINISH

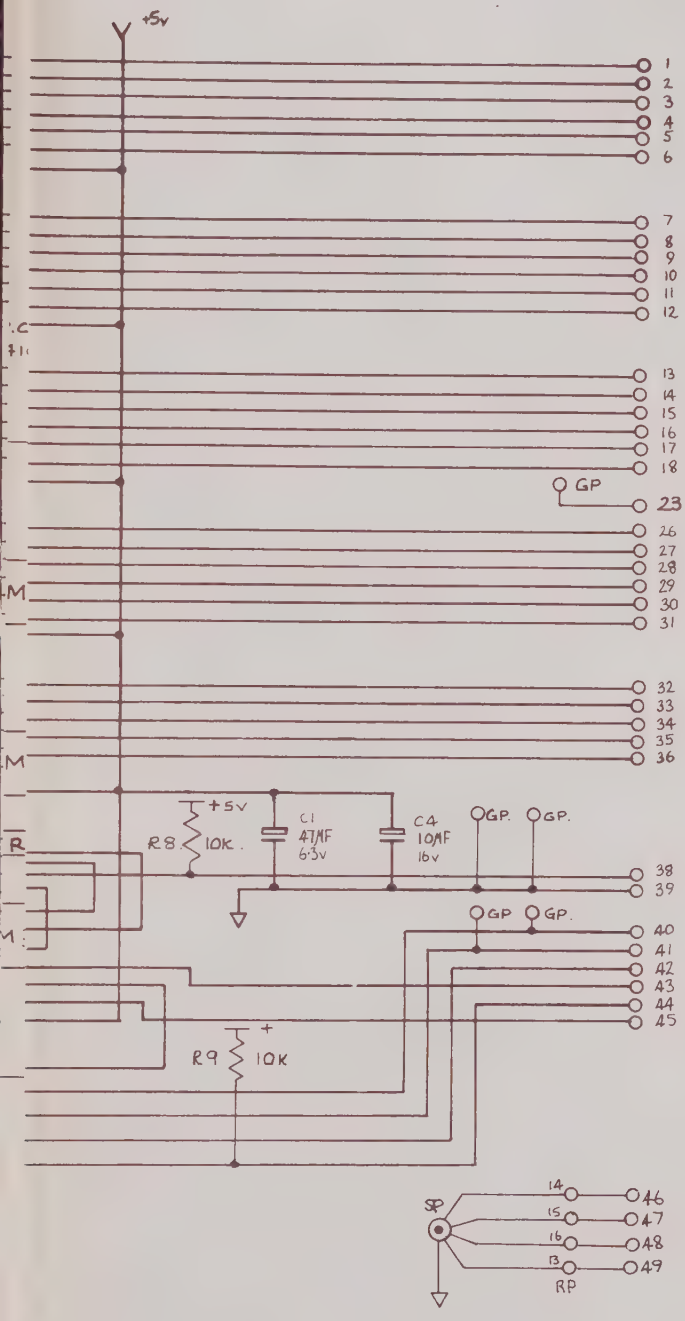
J W 7162

ALL BURRS TO BE REMOVED

NOTES

1. RP = REMOTE PROG SOCKET (1080 OPTION)
2. SP = SHORTING PAD (REMOVED WITH ABOVE OPTION IN)
3. GP = GOLD PIN.

ISS.	CHANGES
4	REDRAWN 14-3-77
5.	ECO 584. S.K. 20-12-77 B.J.
6	@ 1 WAS BC INCL. ECO 681. 31-8-78. W.G.S



datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE TRI STATE B C D B02a 1030 1041 1045

DRAWING No. 430002

SHEET 1 OF 1

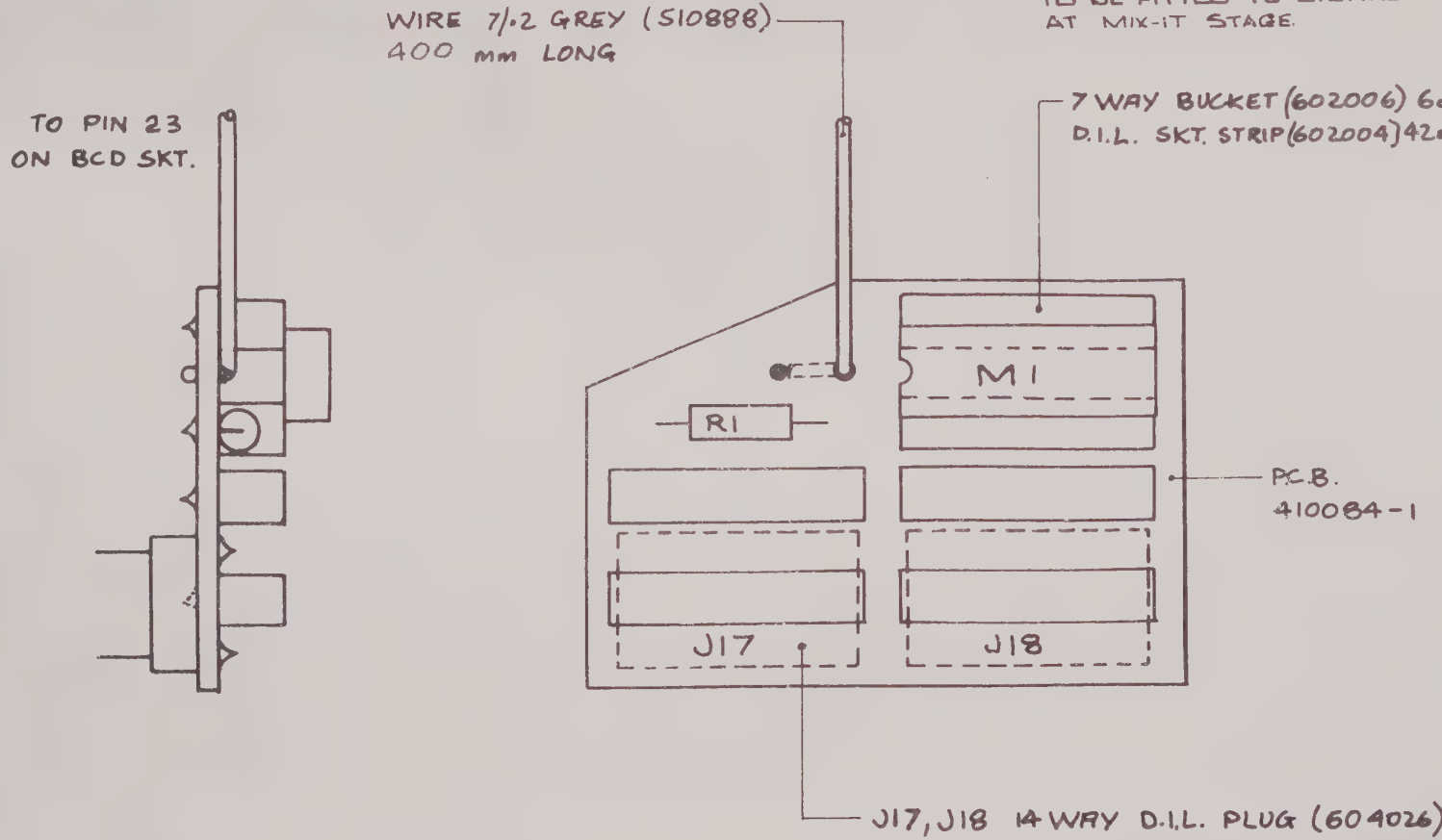
THIRD ANGLE PROJECTION
DRAWN IN ACCORDANCE WITH B.S. 308

ALL BURRS TO BE REMOVED

NOTES ~ 1. C12 TO BE FITTED TO IB01 (IF FITTED) AT FINAL ASSY.

2. 4 OFF 7 WAY BUCKET (602006) & 28 OFF DIL SKT. STRIP (602004) TO BE FITTED TO DIGITAL ASSY AT MIX-IT STAGE.

ISS.	CHANGES
1	Released 17-2-77
2	ADDITION TO PARTS LIST. ECO 574 L.A. 19-12-77 B.J.
3	NOTE 2 ADDED & COMP QTY CHANGES ECO 735 8-NOV 78 W.G.S.

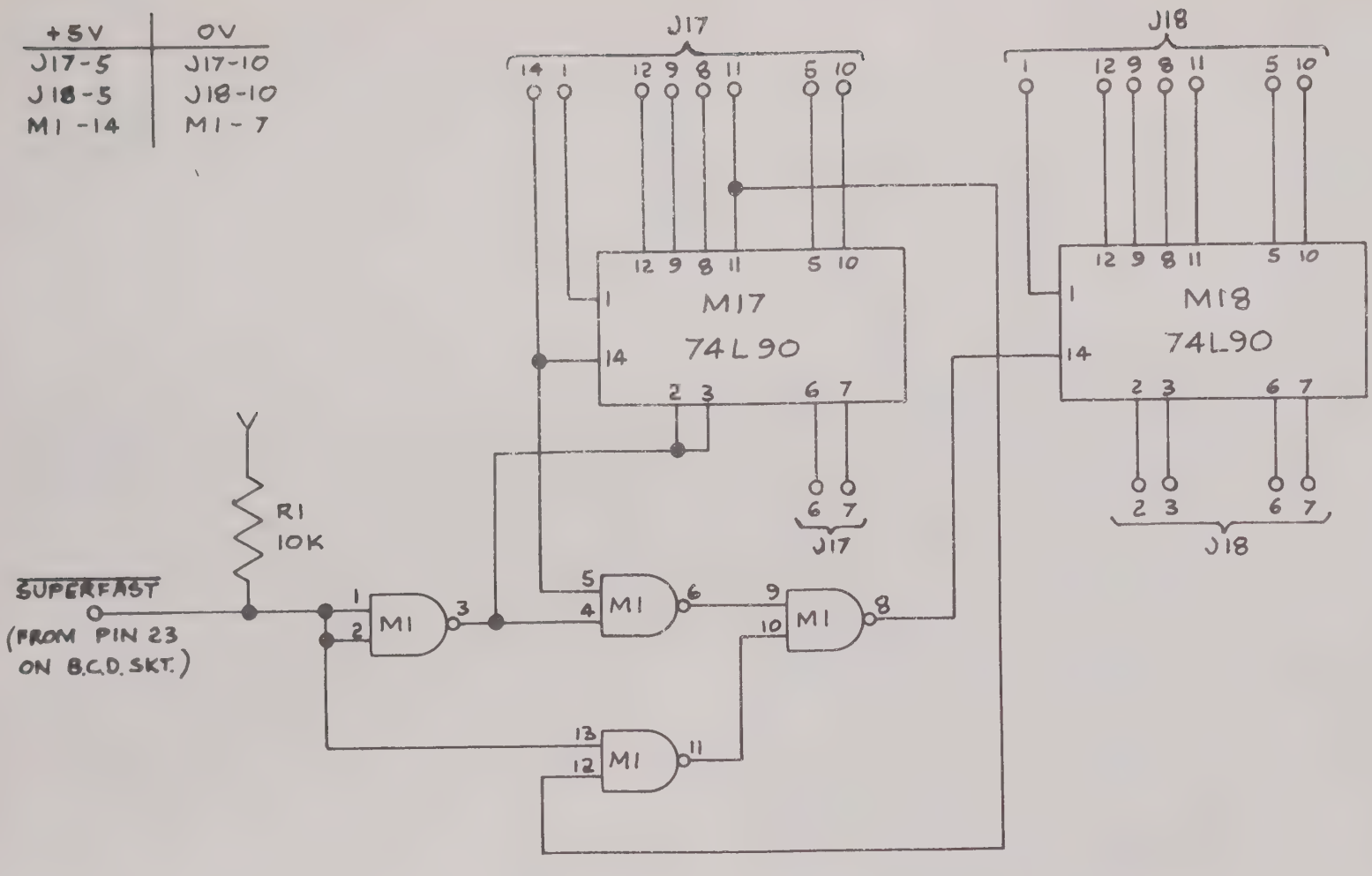


DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	MATERIAL		DRAWING SIZE
M.J.O.			ANGULAR ± ½° INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010		datron ELECTRONICS LTD. NORWICH	A4

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH B.S. 308

+5V	0V
J17-5	J17-10
J18-5	J18-10
M1-14	M1-7



DRAWN M.J.D.	CHECKED	DIMENSIONS IN MILLIMETRES	MATERIAL	datron ELECTRONICS LTD. NORWICH	DRAWING SIZE A4
TRACED	APPROVED	SCALE NOT TO BE SCALED	FINISH	TITLE SUPERFAST READ RATE OPTION SF1 1041	DRAWING No 430258
DATE 17.2.77	DATE 10.5.77				SHEET 1 OF 1

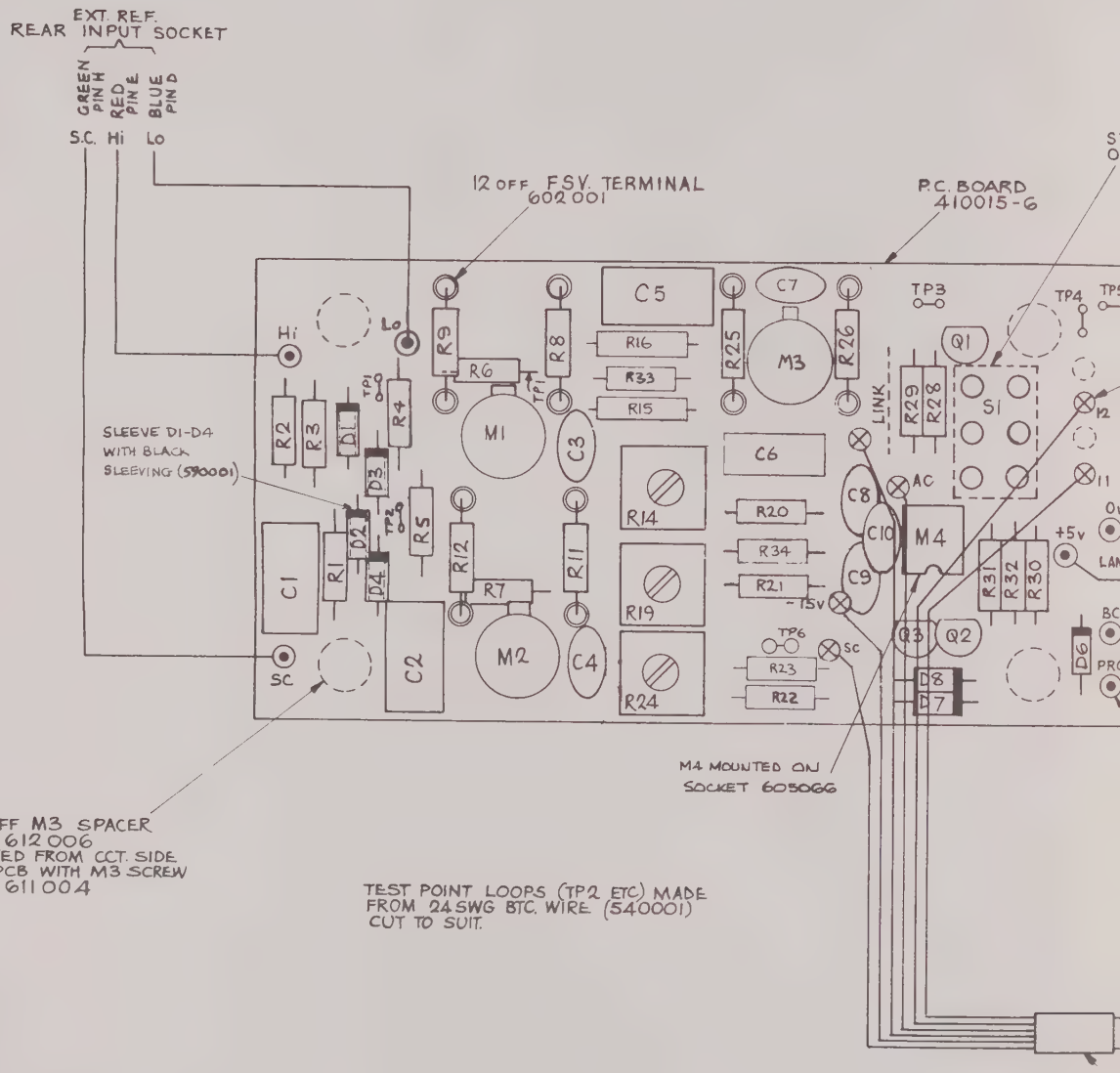
LW/1143

DRAWING No. 400076

FIRST USED ON 1041

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN IV	CHECKED	DIMENSIONS IN MILLIMETRES	TOLERANCES ANGULAR ± ½° INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64 METRIC DIMENSIONS DECIMAL TO 2 PLACES ± .1mm DECIMAL TO 1 PLACE ± .2mm WHOLE DIMENSIONS ± .4mm UNLESS OTHERWISE STATED	MATERIAL	
TRACED	APPROVED L.A.D.	SCALE 2:1 NOT TO BE SCALED		FINISH	
DATE 5.1.78	DATE 22.7.77				

4	5	6

ALL BURRS TO BE REMOVED

NOTES

1. THE FOLLOWING DIODES ARE TO BE SLEEVED WITH BLACK SLEEVES (590001) D1 TO D4 (4off) ½" SLEEVE 10"/M PER DIODE.

ISS.	CHANGES
2	ECO. 135 REDRAWN & RE DESIGNED IV 5.1.76
3	ECO. 189. R19 WAS 80R. M.J.D. 18.4.76.
4	ECO 204 20.9.76 R33, R34 ADDED MOD. TO PCB ISSUE 6
5	ECO 275 1.9.76 D1, D2, D3 & D4 SLEEVED PTH
6	PT. LTS. CHANGES ECO 417. 31.3.77. PTH
7	ECO. 691. 25.5.78 PARTS LIST CHANGES
8	C1 & C2 WERE 0·68uF ECO 720 8 NOV 78 W.G.S

ITCH (S1) 700019, FITTED TRACK SIDE OF P.C.B.

6 OFF SOLDER TERMINAL 620003

D5

RELAY SOCKET 602 007, SOLDERED INTO PCB.

28v RELAY 330 003, PRESSED INTO SOCKET USE CLIP 630 005, TO RETAIN RELAY.

RL1

	PROG. & BCD FITTED	PROG. ONLY FITTED	BCD. ONLY FITTED
PINK	PIN 2 PROG. SOCKET	PIN 2 PROG. SOCKET	PIN 39 ON BCD. SOCKET
RED/BLACK	+5v PIN ON PROG PCB.	+5v PIN ON PROG. PCB.	+5v PIN ON BCD. PCB.
VIOLET	PIN 25 BCD. SOCKET	NO CONNECTION	PIN 25 BCD SOCKET
ORANGE	PIN 7 PROG. SOCKET	PIN 7 PROG. SOCKET	NO CONNECTION

7 OFF CONNECTOR TERMINAL 601 002

LEADS OFF TO A-D ASSEMBLY	
+15v	RED
-15v	BLUE
A.C.	GREEN
-5v INT. REF. (11)	BROWN
REF. TO A-D (12)	WHITE
S.C.	BLACK

LEADS 100mm. LG

EVE 590002 IN HALF

6 OFF SNAP CONNECTORS + SLEEVE 590001

datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE 1041 - RATIO AMPLIFIER (1v I/P) ASSEMBLY

DRAWING No. 400076

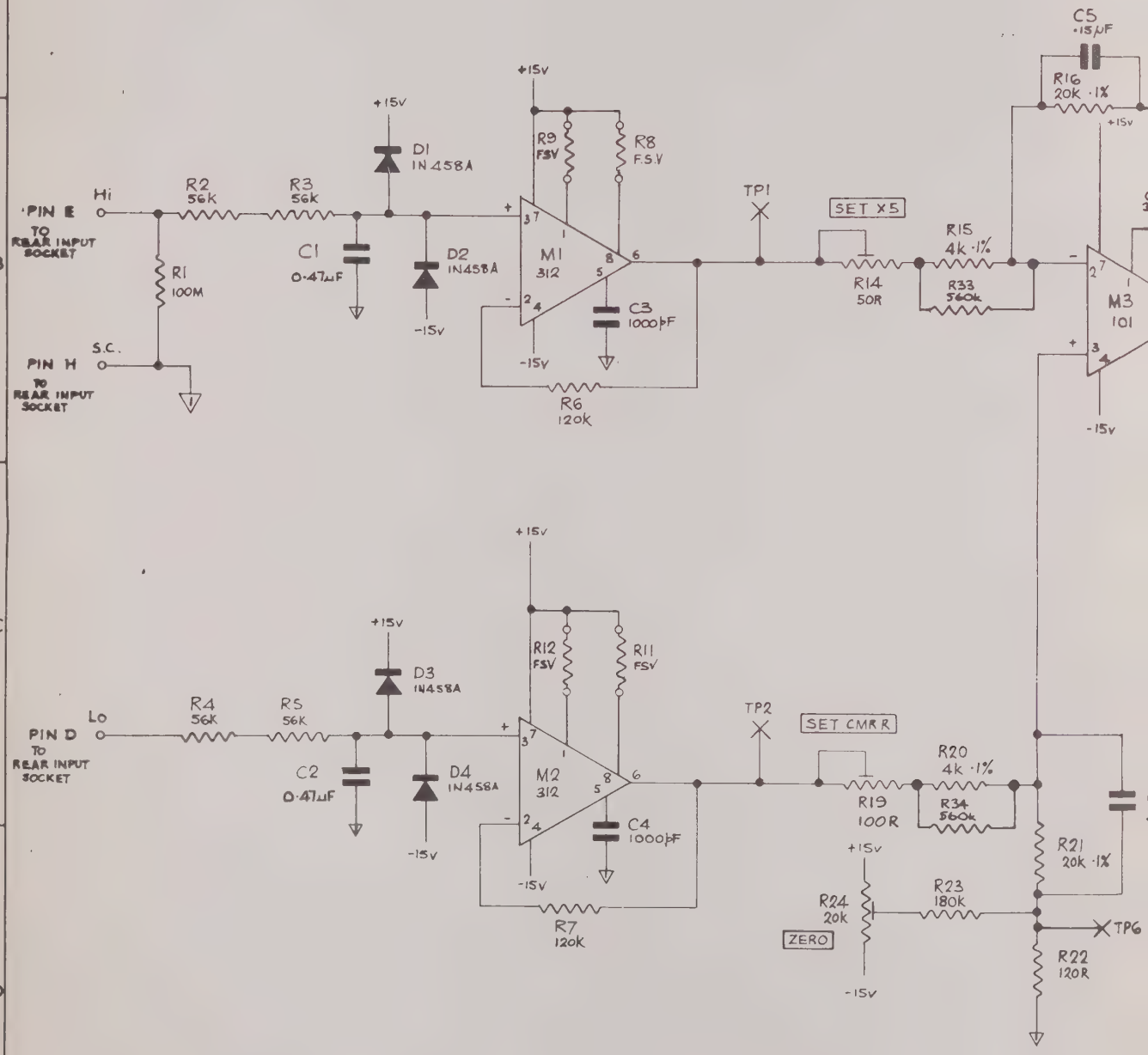
SHEET 1 OF 5

DRAWING No. 430017

FIRST USED ON 1041

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



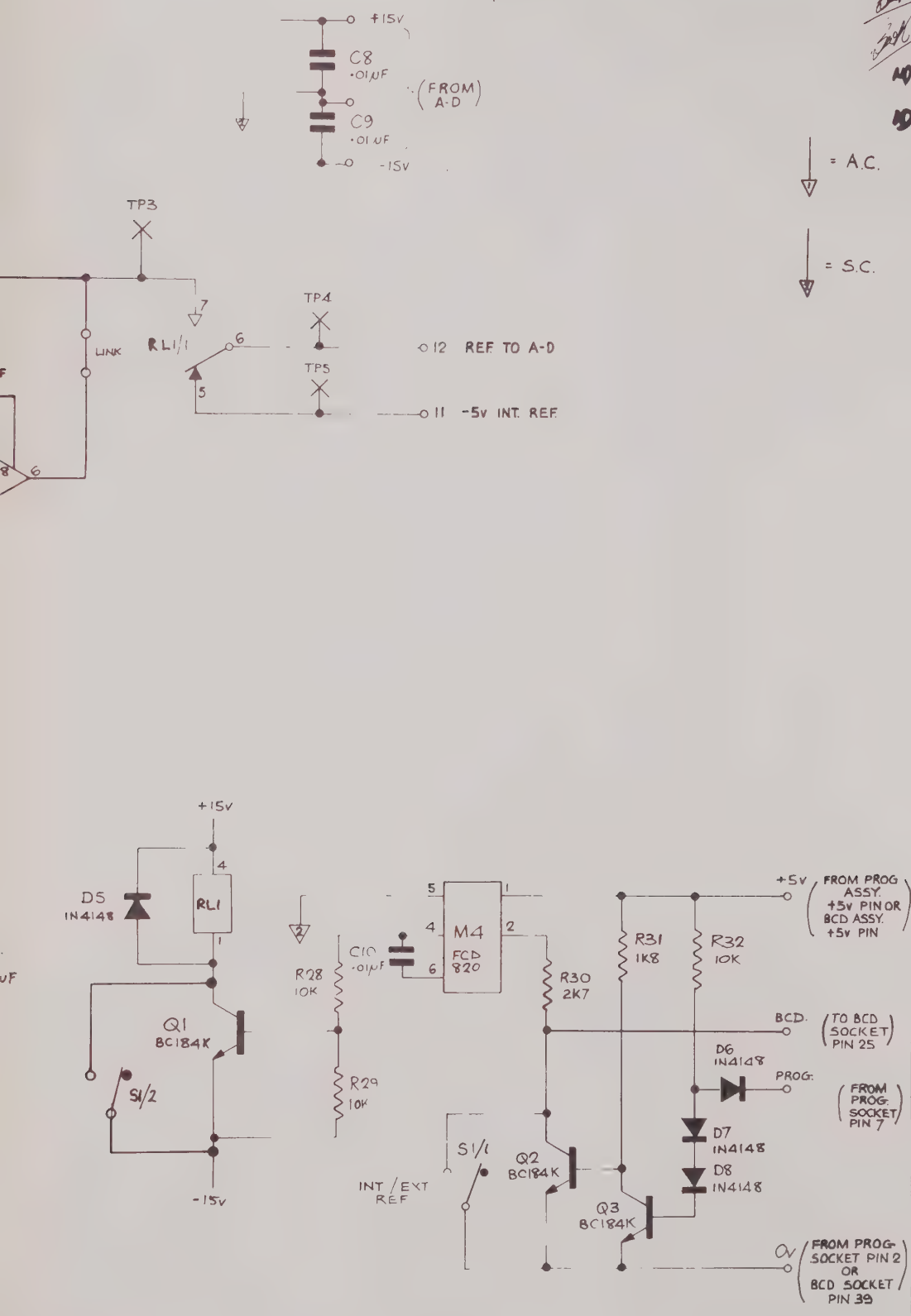
DRAWN IV	CHECKED	DIMENSIONS IN MILLIMETRES	TOLERANCES ANGULAR ° INCH DIMENSIONS DECIMAL TO 2 PLACES ± .005 DECIMAL TO 3 PLACES ± .001 FRACTIONAL ± 1/64 METRIC DIMENSIONS DECIMAL TO 2 PLACES ± .05 DECIMAL TO 3 PLACES ± .025 WHOLE DIMENSIONS ± 1 UNLESS OTHERWISE STATE	MATERIAL
TRACED	APPROVED L.A.D.	SCALE / NOT TO BE SCALED		FINISH
DATE 7.1.76	DATE 2.2.77			

4 | 5 | 6

LL BURRS TO BE REMOVED

NOTES

ISS.	CHANGES
2	ECO 135 CIRCUIT REDESIGN
3	ECO.189. R19 WAS 50R. M.J.D. 13.4.76
4	ECO 204 R30, R34 ADDED. M3 WAS 3V7. S1/2 ADDED 20.9.76
5	ECO.691. 28.5.78 M3 WAS 301 OP AMP
6	C16 C2 WERE 0·68µF ECO 760 @ NOV 78 W.G.S



DRAWING SIZE A2

datron ELECTRONICS LTD. NORWICH.

TITLE 1041 - RATIO AMPL & SWITCHING (1v I/P)

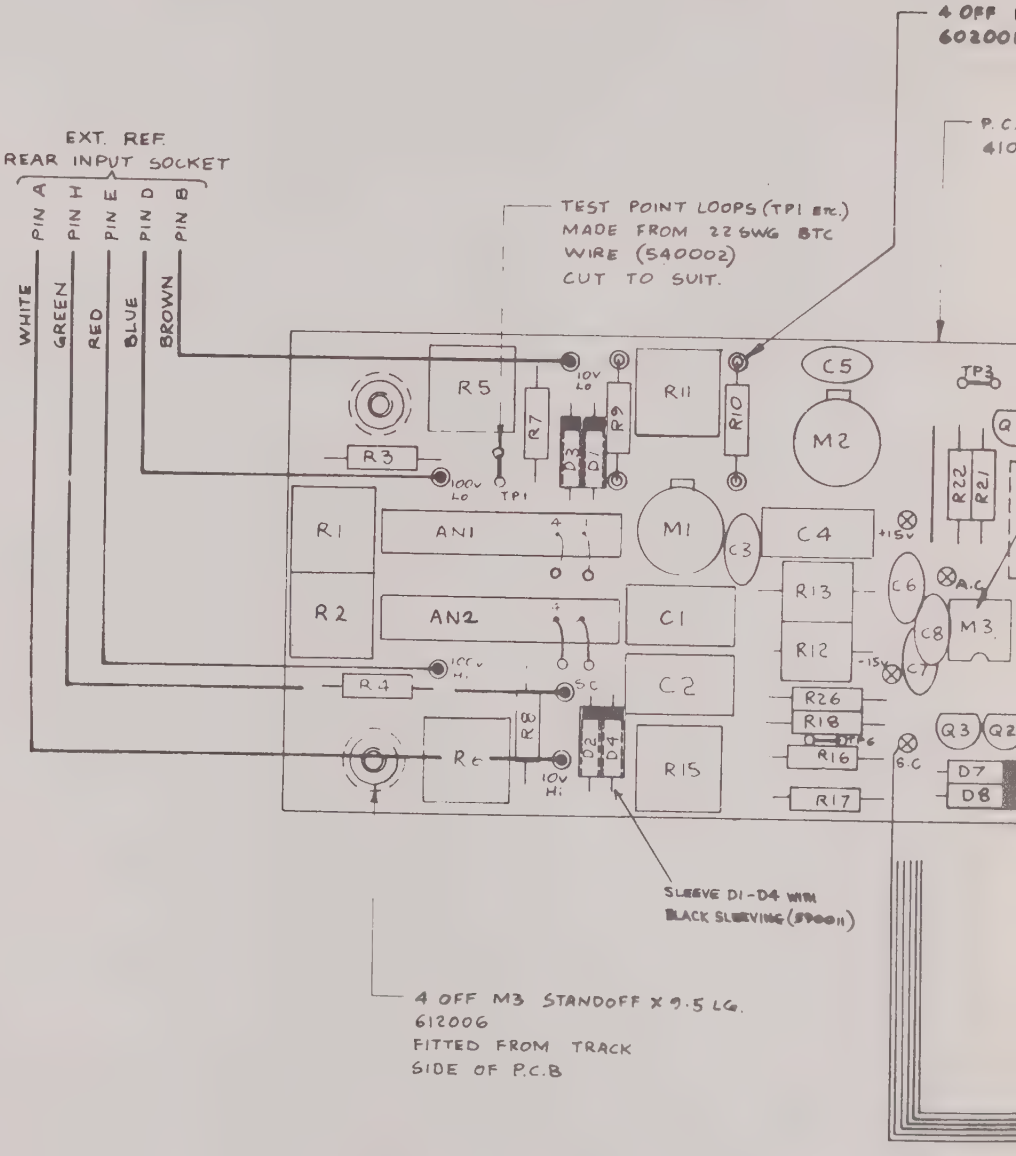
DRAWING No 430017

SHEET 1 OF 1

DRAWING No.	
400179	
FIRST USED ON	1041

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES ANGULAR °	MATERIAL
M.J.D.		MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64 METRIC DIMENSIONS DECIMAL TO 2 PLACES ± .1mm DECIMAL TO 1 PLACE ± .2mm WHOLE DIMENSIONS ± .4mm UNLESS OTHERWISE STATED	
TRACED	APPROVED L.A.D.	SCALE 2:1		FINISH
DATE 27-8-76	DATE 2.2.77	NOT TO BE SCALED		

W1162

4	5	6
ALL BURRS TO BE REMOVED		NOTES

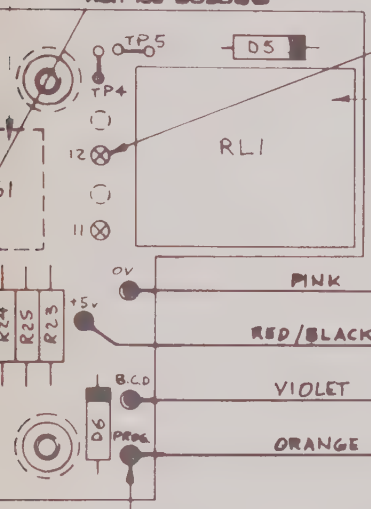
ISS.	CHANGES
3	ECO 307 D1-D4 SLEEVED. P.M. 20.10.76
3	ECO 417 PTS. LTS. CHAN 686. P.M. 21.3.77
4	ECO 691 26.5.78 PARTS LIST CHANGES
5	C1 & C2 were 0.68µF ECO 760 8 NOV 78 W.G.S

M TERMINAL

OARD
17-2

SWITCH 700019 FITTED ON TRACK SIDE OF P.C.B.

M3 MOUNTED ON SOCKET PART No 608068



6 OFF SOLDER TERMINAL 620003

RELAY SOCKET 602007 SOLDERED INTO PCB.
28V RELAY 330003 PRESSED INTO SOCKET.
USE CLIP 630005 TO RETAIN RELAY.

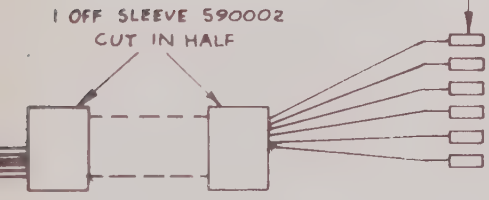
PROG. & BCD. FITTED	PROG. ONLY FITTED	BCD. ONLY FITTED
PIN 2 PROG. SOCKET	PIN 2 PROG. SOCKET	PIN 39 ON BCD SOCKET
+5V PIN ON PROG. PCB.	+5V PIN ON PROG. PCB	+5V PIN ON BCD. PCB.
PIN 25 BCD. SOCKET	NO CONNECTION	PIN 25 BCD SOCKET
PIN 7 PROG SOCKET	PIN 7 PROG. SOCKET	NO CONNECTION

PINK
RED/BLACK
VIOLET
ORANGE

9 OFF CONNECTOR TERMINAL 601002.

6 OFF SNAP CONNECTOR 602003
AND SLEEVE 590001
(FIT SLEEVES OVER SNAP CONNECTORS AND SOLDER TERMINALS)

1 OFF SLEEVE 590002
CUT IN HALF



LEADS OFF TO A-D ASSY. (ANAL. SECTION).		
FUNCTION	COLOUR	LENGTH
+15V	RED	100 mm
-15V	BLUE	"
AN. COM.	GREEN	"
-5V. REF. SENSE-OUT (11)	BROWN	"
EXT. REF. SENSE-IN (12)	WHITE	"
SIG. COM.	BLACK	"

datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE
RATIO AMP (10/100V I/P) ASSY, 1041

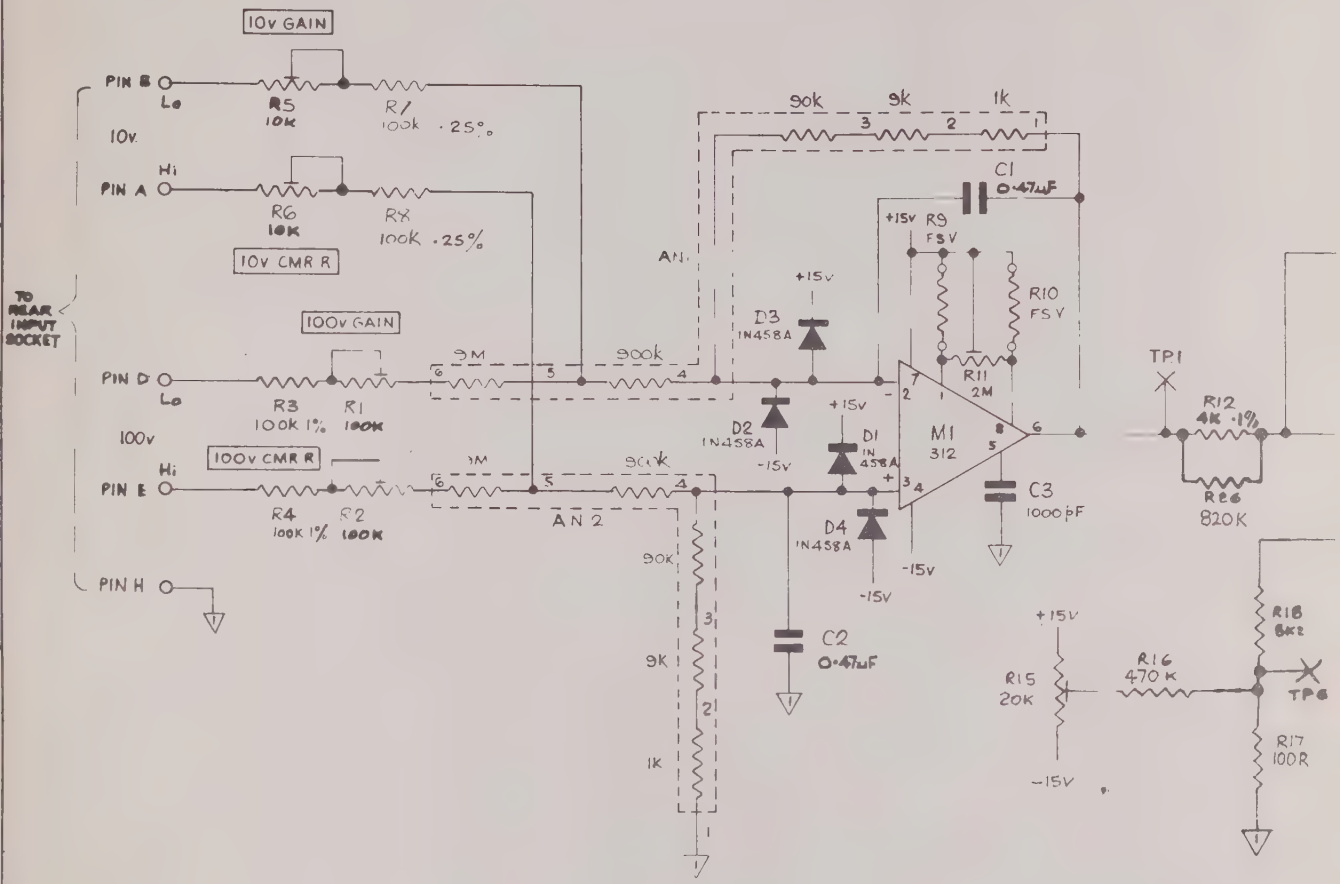
DRAWING No. 400179

SHEET 1 OF 6

DRAWING No.
430179
FIRST USED ON 1041

THIRD ANGLE PROJECTION

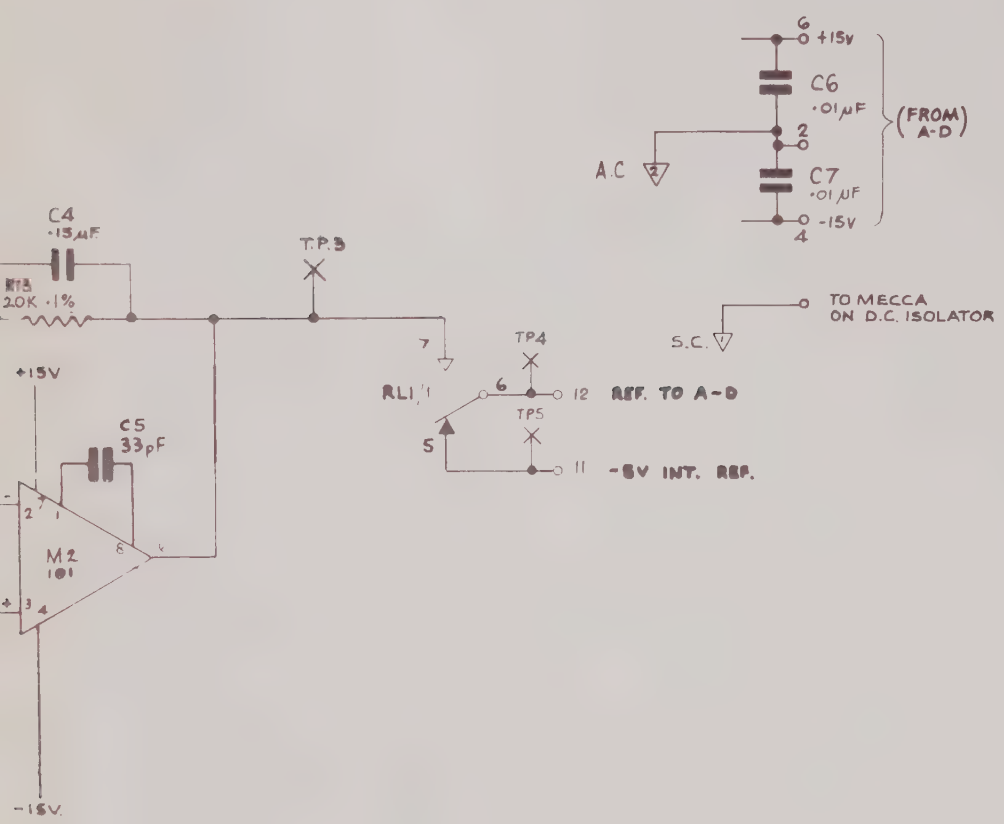
DRAWN IN ACCORDANCE WITH BS 308

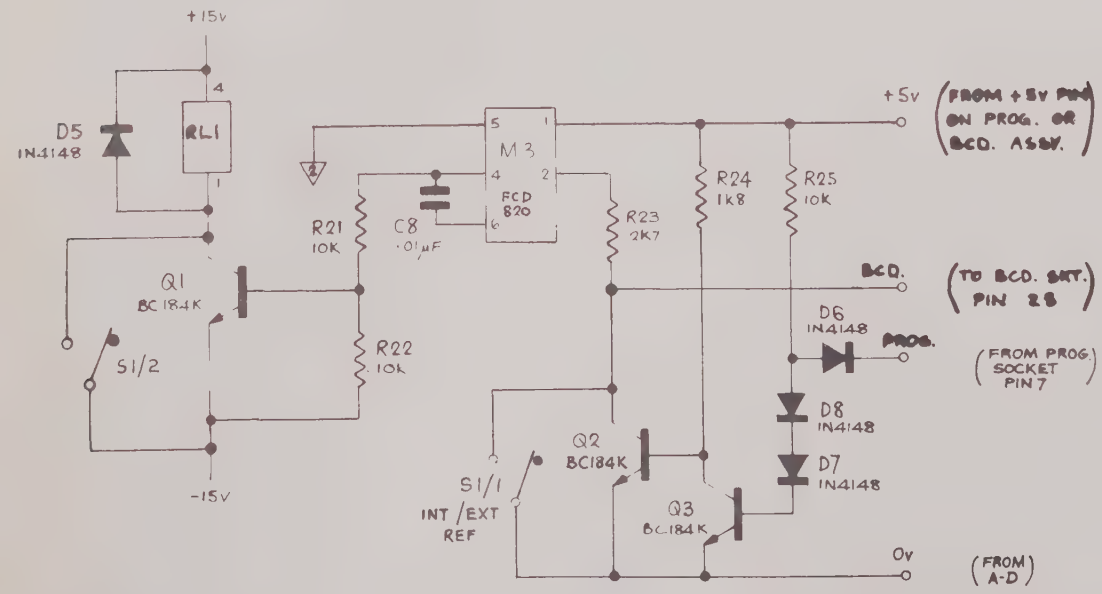


DRAWN MJD	CHECKED	DIMENSIONS IN MILLIMETRE	MATERIAL
TRACED	APPROVED L.A.D.	SCALE	FINISH
DATE 26-8-76	DATE 2.2.77	NOT TO BE SCALED	

L BURRS TO BE REMOVED

NOTES





datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE 1041 – RATIO AMPL & SWITCHING (10v/100v I/P)

DRAWING No 430179

SHEET 1 OF 1

ADDENDUM AND ERRATA SHEETS INDEX

INSTRUMENT:

SERIAL NO:

COMPONENT PARTS AND SERIAL NOS.	ASSOCIATED UPDATE SHEETS

ERRATA SHEETS: